amateur radio

VOL. 43, No. 2 FEBRUARY 1975

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COVER PHOTO

Peter Williams, VK3IZ, operating at VK3AUP, one of the WICEN HF control stations during the Darwin Disaster. See page 9 for further information.

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA, FOUNDED 1910

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FIRE !

At the same time as cyclone Tracy was wreaking havoc on Darwin, a fire gutted the building occupied by the printer of Amateur Radio magazine.

Much of the material which had been prepared for this and future issues of AR was destroyed, including manuscripts, drawings and photographs.

We have had to find a new printer, arrange re-drawing of diagrams by our draftsmen, and commence the tedious business of resurrecting the destroyed articles.

Following is a list of articles whose publication will be delayed because of the fire:—

"Some Useful Modifications to the FT101 Series" — Geoff Wilson, VK3AMK.
"Vertical Extended Double Zepp for 2 Metres" — John Hassell, VK6ZGE.
"A Cradle for Ken" — Mike O'Burtill, VK3WW.
"Rotating a 3-Element 20 Metre Beam with a Stolle" — Les Newsome, VK4LR.
"Modifying the Trio JR60 Receiver" — C. P. Daw, VK2AGJ.
"A Mini-Size Field Strength Meter" — Maurie Evered, VK3AVO.
"Modification to the VK3ABP 2 and 6 Metre Converters" — Geoff Wilson, VK3AMK.
"The Shack" — J. A. Gazard, VK5JG.
"Microstrip Data Curves" — Neil Weste, VK5TB.
"Vehicle Ignition Noise Suppression" — Rod Champness, VK3UG.
"Antenna Measurements" — Dick Turrin, W2IMU.

Bill Roper, Editor

AND THE AMATEUR FREQUENCIES JUSTIFIED?

This was a question asked in Mobile News and G3BID in the Oct. '74 issue says he well remembers in the old days winding his own coils but he did not refine his own copper nor draw the wire so he might even in those days have been classed as an appliance user having actually bought the wire off the shelf. He wound his own coils for no other reason than that they could not be bought. As soon as coils, etc., could be purchased the amateur was then free to spend more time experimenting with systems of modulation, antennas, etc. Gradually we could buy our transmitters off the shelf and, so he says, this is progress and allows the amateur to move on to the next problem. Let us be grateful, he concludes, that much of the ground work is taken off the amateur by his being able to buy a 'black box' so that he has far more time available for experiments on the vast number of subjects which still need to be investigated.

GARBAGE CAN LIDS

"Several of the smoothly-rounded type of ordinary domestic galvanised iron dustbin lids", writes G3RPE in his Microwaves column in Radio Communications for Oct. '74, "have been checked and all have been found sufficiently accurate paraboloids to make efficient dishes at frequencies up to 10 GHz at least. Their diameters ranged from 18 to 24 inches. A rule of thumb is that a dish should have a diameter exceeded 5 pi and preferably 10 pi at the frequency of operation so this size of dish is best used above 3 or 8 GHz. The gain to be expected (on one model) ranges from about 76 dB at 5760 MHz to 38 dB at 24 GHz".

THOUGHT

QST, Oct. '74, has a quote of the month by WA4BDW "So long as we depend on the publicly-owned frequencies for amateur radio's very existence, we had better make sure the public knows who we are and what we do".

ANYTHING FROM DC TO DAYLIGHT

YAESU

FT-101B TRANSCEIVER: 160/10mx, 300w peak input SSB incl. noise blanker, fan, AC/DC. Price $585 incl. tax. Available ex-stock.

FT-501 DIGITAL READ-OUT TRANSCEIVER: 80-10mx, SSB/CW 500 watts peak input. Incl. 2 speed fan, noise blanker VOX etc, for the bargain price of $750 incl. power supply. Delivery 26 days on 50% deposit.

FT-75 TRANSCEIVER: SSB/CW noise blanker, very small and a perfect mobile rig (80w pep transistorised). Price $245; AC pwr supply $65. DC pwr supply $75.

FL-2100B LINEAR: Price $388 incl. tax. Delivery four weeks.

FT-201 TRANSCEIVER: 80/10mx. Price $505.

90-DAY WARRANTY ON ALL PRODUCTS

TRIO

TS-520D TRANSCEIVER: AC/DC, noise blanker, full metering, 25KHz crystal filter. Come and inspect this incredible transceiver (avl ex-stock) for yourself and note the price, too: $520 incl. tax and the VICOM 90 day warranty.

QR-666 ALL BAND COMMUNICATIONS RECEIVER: 170KHz to 30MHz Kit $230; assembled $275.

KEN

KP-202 incl 4 channels $150. Charger and Nicad set $32, stubby helical whip $8.90. Extra crystals $7.80 pr.

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Seiwa SV230 2 metre FM 12 channel transceiver featuring 25 watt/1 watt power switch, priority channel system and internally mounted deviation control. Sensitivity is .5 uv or better for 20 db quietening. Adjacent channel rejection is 70 db or better. Fitted with channels, 1, 4, and 50. $198 — available ex-stock.

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MULTI-7 2M FM MOBILE TRANSCEIVER: incl 3 chs 1/4/50. SPECIAL PRICE $185. Extra crystals $7.80 pr. This introductory price lasts to 6th March only, so hurry!

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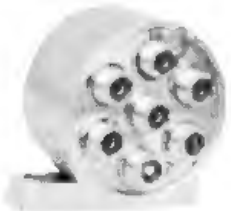
D.60 FREQUENCY COUNTER incl 2 metre prescaler $360.
RB-145 MAST-HEAD AMP: 144-146 MHz $32 incl tax.
RB-147 MAST-HEAD AMP: 146-148 MHz $32 incl tax.
ELECTRONIC DISPLAY DIGITAL CLOCK: $39.90.

12 volt 3 amp fully regulated pwr supply, $28.

RAC ANTENNA — VICOM HAVE BEEN APPOINTED AUSTRALIAN AGENTS!



CX-6A

CX-2A 52 ohm 2 pos coax switch $21.
CX-6A (a) 52 ohm 6 pos 1.5 kw to 500 MHz $54.
CX-6A (b) 75 ohm 6 pos 1.5 kw to 500 MHz $54.
AL-48 DXN 40/80 trap dipole $31.
AL-24 DXN 20/40 trap dipole $24.
A-4VPN 40m trap dipole $24.
A-8VPN 80m trap dipole $26.50.

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OUR POLICY: Persons not in possession of the appropriate certificate of proficiency will not be sold amateur equipment. This may have to be produced on request. Our terms of trading are strictly net cash, no COD, no credit other than Bankcard. All equipment sold carries the VICOM 90-day all-inclusive warranty. Add extra for freight or postage. Insurance cover 50c per $100. Prices subject to change without notice.

WARNING!

AN IMPORTANT NOTICE CONCERNING THE USE OF WALKIE-TALKIE TRANSCEIVERS

A number of low powered, short range radio telephone units — commonly known as walkie-talkies or handphones — have been imported and sold in Australia during the last twelve months.

Many of them are technically inferior and cannot be licensed because they do not meet the standards laid down under the Wireless Telegraphy Act and Regulations.

Many of them are designed to operate on a frequency which causes interference both to essential service communication concerned with the safety of life and property — and to the reception of normal radio and television broadcasting.

The use of such unlicensed (or unlicensable) sets is in contravention of the Wireless Telegraphy Act. The penalty for using radio equipment for the transmission and reception of messages without a licence is imprisonment for six months, or a fine of up to $100.

People contemplating purchase of radio telephone units should first check with the Regulatory & Licensing Section of the Post Office to ascertain whether licences would be granted to use the units for the purpose they have in mind.

Importers: Please note that only radio telephone units which meet Australian Post Office approval may be licensed in this country. Claims by overseas manufacturers that licences are not necessary should be disregarded. Embarrassment to importers, retailers and purchasers will be avoided if licensing eligibility is ascertained before import orders are placed. Such information may be obtained from the Superintendent, Regulatory & Licensing at Post Office headquarters in any state.

THE PENALTY FOR UNLICENSED USE IS 6 MONTHS IMPRISONMENT OR A FINE OF UP TO

$100

AUSTRALIAN POST OFFICE

APO192

SIDEBAND ELECTRONICS SALES and ENGINEERING

YAESU MUSEN SEEMS TO HAVE CHANGED THEIR PRODUCTION PLANS AGAIN! PRESENTLY THE FT DX 401 WILL BE DISCONTINUED and THE PRODUCTION OF THE FT-FP 200 TAKEN UP AGAIN. THIS SHOULD PLEASE A LOT OF PEOPLE.

YAESU-MUSEN

FT 101 B AC-DC transceivers 8 weeks delay	$575
YC 355 D digital frequency counter still only	$250
Spectronics DD-1 digital counter for 101 / 401	$150
FT DX 400 / 560 noise blankers	$20
FT-FP 200 ex stock!	$420

TRIO-KENWOOD

TS 520 AC-DC with speaker	$550
External VFO for TS 520	$80

HY-GAIN ANTENNAS

14 AVQ 10-40 M vertical 19 feet tall no guys	$65
18 AVT / WB 10-80 M vertical 23 feet tall no guys	$90
TH3JR 10-15-20 M junior 3 el. Yagi	$135
TH3Mk3 10-15-20 M senior 3 el. Yagi soon	$180
TH6DXX 10-15-20 M senior 6 el. Yagi	$225
204BA 20 M monoband 4 el. full size Yagi	$190
Hy-Quad 10 / 15 / 20 M full size Cubical Quad	$200
Magnetic base mobile whip 108 MHz up with 18' RG-58U cable and coax plug	$18

CDR ANTENNA ROTATORS

AR-20, smallest model only for 2m beams	$40
AR-22R for stacked 2 & 6m or small HF beams	$50
Ham II with re-designed control box, now with separate brake-control	$150
All for 230V AC with indicator-control units.	
4-core cable for AR 20-22 p. yard	20 cents
8-core cable for HAM II heavy duty	60 cents
Light 12-core cable for HAM II	30 cents per yard

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Model XCR-30 Mk II 500 kHz to 31 MHz continuous coverage, crystal controlled reception of AM / USB / LSB / CW	$250

NOISE BRIDGES

Omega TE 01 up to 100MHz	$28

POWER OUTPUT METERS

Galaxy RF-550A with 6 pos. coax switch	$75

SWR METERS

Midland twin meter type, 52 ohms	$22

BALUNS

New Japanese model, 52 or 75 Ohm 1 KW PEP	$10

MOBILE ANTENNAS

MARK helicals 6 feet long	HW-40 for 40 M	$18
	HW-20 for 20 M	$16
	HW-80 for 80 M	$18
	high power KW-40 for 40 M	$25
	tri-band helical HW-3. 10 / 15 / 20 M	$25
ASAHI AS-303A 10-80 M set		$90
Swivel Base for MARK'S		$6

CUSH CRAFT ANTENNA PRODUCTS

DGPA 27-50 MHz ground plane	$25
AR-2 144 MHz Ringo	$20
LAC-2 lightning arrestors	$6

CRYSTAL FILTERS

9 MHz similar to the FT 200 ones. with carrier xtals	$35

POWER SUPPLIES

240 AC to 12V DC 3 to 3.5 Amps. regulated	$35

MIDLAND

PTT dynamic microphone	$10

27 MHz NOVICE LICENSEE & CITIZEN-BAND EQUIPMENT

MIDLAND 5 W AM 23-channel transceivers complete with PTT mike all channel crystals 12 V DC op. $95

MIDLAND 13-893 SSB-AM 23 channel 15 W PEP transceivers $175

SIDEBAND BRAND NC-310 one Watt hand-held transceivers **$50**: SE-501 SSB-AM 15 W PEP SSB 23-channel transceivers, complete with PPT mike, etc. 12V DC $190

144 MHz TWO METRE EQUIPMENT

MULTI-7 solid state 24 channel FM 12V DC transceivers, 1 and 10W output, receiver with FET rf stage and mixer, equipped with crystals for TEN Australian channels Nos. 40, 42, 44, 46, 48, 50, 54, 56, 58, 60, to be used either transceive or combinations repeaters and ANTI-repeaters, complete with PTT microphone, mounting bracket **$225**

KEN PRODUCTS KP-202 hand-held 2 W output transceivers, now with 4 Australian channels, 40 & 50 plus a choice of 2 repeaters 42-54, 44-56, 46-58, 48-60 **$150**: KCP-2 battery charger and 10 NICAD batteries **$35**: Leather case for KP-202 **$6**: Flexible helical whip for KP-202 **$6.50**: Extra crystals for KP-202 two crystals p. channel **$8.**

KLM ELECTRONICS solid state 12V DC 2 M. amplifier, 12 Watt output, automatic antenna change-over when driven, ideal for mobile use with the KEN KP-202 $50

All prices quoted are net, cash with orders, sales tax included in all cases, subject to changes without prior notice. No terms nor credit nor COD, only cash and carry, Government and Public Company orders no exceptions. Include 50 cents per $100 value for all-risk insurance, minimum insurance $0.50. Allow for freight, postage or carriage, excess will be promptly refunded. MARY & ARIE BLES, Proprietors.

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TELEPHONE, **DURING BUSINESS HOURS ONLY!** STD 047 511-394

QSP

DOES COLOUR TV QUALIFY FOR INTRUDER WATCH ACTION?

The following is the text of a letter sent by the Executive on behalf of the Institute to the PMG and others in specific reference to the use of TV channel 5A:

"At the recent Inquiry into Frequency Modulation Broadcasting a submission on behalf of this Institute was made that the broad principle of international uniformity should be followed in the use of the electromagnetic spectrum particularly in relation to the entertainment service. The submission also supported the early introduction of UHF television and recommended relocation of stations using channel 5A and channel 0 to the UHF band as soon as possible.

Unfortunately a decision has been made (possibly due to economic considerations) that there shall now be greater use of channel 5A.

The spectrum between 108 and 170 MHz is allocated World Wide to such International services as Aeronautical, Land and Harbour mobile, Satellites and Amateur. Australia however is the only country to have allocated a television channel in this segment; vide note 279A.

Past experience, (as indicated by the need to hold the Independent Inquiry into FM Broadcasting) has shown the necessity for conformity with international allocations and the economic penalties incurred by non-conformity. These penalties may be expected to increase greatly the longer conformity is delayed.

Therefore it is submitted that before the use of channel 5A becomes more widespread, a decision should be made at once to phase out its use for television. To permit this to take place as soon as possible it is urged that the fitment of UHF tuners to all production television receivers be made mandatory immediately, thereby permitting the early introduction of UHF television. This will also permit implementation of the Institute's recommendation to the FM inquiry that channel 0 be transferred to UHF on the grounds that it is the TV channel most susceptible to electrical interference, that it can produce interference problems in conjunction with FM broadcasting and that there are technical difficulties with transmitting colour on this channel.

It is considered that there will be a long term benefit to the community as a whole if action along the lines recommended can be taken without delay by all authorities concerned."

This is yet another step taken by the Institute in an attempt to tidy up the VHF spectrum allocations.

Most of us are aware of the uniqueness of the Ch. 5A allocation but how many amateurs realise that we appear to have yet another burden about to be placed on our backs, namely colour TV, in association with the allocation of the Channel 5A and Channel 0 frequencies.

The problem of introduction of colour TV is not so much the interference caused by amateurs to its reception as to the interference by the colour broadcast itself. Interference by amateurs may not apparently be as big a problem as we were led to believe.

Complaints are coming in from members about additional spurii appearing in the 6 metre band whilst colour programmes are being transmitted. It is demoralising enough to have TV channels adjacent to our bands without having to put up with noise and crud from them within our bands.

At this stage more details are essential in order to prepare suitable, properly documented, submissions to the appropriate authorities.

Are you experiencing more problems in using 6 metres or any other of your favourite bands since colour TV began? Can you specifically pinpoint any additional noise or interference on the bands concerned which can properly be attributed to colour TV? If so, write in with full details plus, of course, any data on the Ch. 5A problem which has come within your own practical experience.

Peter Wolfenden, VK3ZPA
Member of the Executive
Chairman VHF/UHF Advisory
Committee

AMATEUR RADIO LICENCE FEES CORRESPONDENCE

Postmaster-General,
Canberra, A.C.T., 2600

Dear Colonel Bennett,

I refer to your letter of 30th September, 1974, addressed to the Minister for Defence, the Honourable L. H. Barnard, concerning the recent increase in fees for amateur radio station licences.

I should like to explain that licences for civil radiocommunication stations are granted in accordance with the provisions of the Regulations made under the Wireless Telegraphy Act. These Regulations provide for the payment of an annual fee in respect of the grant or renewal of such licences and the revenue collected is intended to cover the costs incurred by my Department in its role of ensuring the orderly development and conduct of radiocommunication services generally. Since 1950, developments in techniques have been such as to permit of a large expansion in the commercial and other fields and more than 203,000 licensed stations are now in operation. I need hardly add that in order to meet the varying requirements of users it has been necessary for my Department to institute a wide variety of licensing conditions which add to the administrative load.

There have been developments in amateur radio corresponding to those referred to above. Thirty years ago, for instance, there were only 335 licensed amateur transmitting stations using quite limited operating techniques. The number has now grown and at June, 1974, there were 5698 licensed stations using a far greater range of techniques than in earlier years. Today amateur licensees are authorised to pursue experiments in the V.H.F., U.H.F. and S.H.F. bands, to undertake television experiments and to employ single sideband and pulse transmissions. Amateur licensees also now engage in experiments involving moon reflected signals and communication satellites.

In determining the new fee structure which was to apply to all radio services, account was taken of the fact that the costs associated with the licensing and surveillance of land and fixed stations are greater than those associated with stations in the mobile category. Accordingly the fee for the former has been set at a higher rate than for the latter.

Although the large majority of amateur stations more appropriately belong in the fixed category, it was decided that because amateur stations have no commercial involvement and their activities are normally confined to experiments that they should be included in the lower rate licence fee category. Nevertheless, the Government's views in relation to leisure time activities should not be construed as to presume its acquiescence to the community at large bearing any portion of the costs involved in the pursuits of hobbyists.

In return for this $12 fee my Department is required to grant licences, issue and record call signs, inspect stations, investigate complaints, arrange for reciprocal agreements with other countries, frequency measure and monitor transmissions as required and liaise with other Administrations and the International Telecommunications Union in regard to amateur radio stations generally.

You may be assured that I am well aware of the part which amateur radio operators have played and are continuing to play in providing emergency communications during national emergencies. I also appreciate the encouragement given to the study of the radio art through amateur radio activities.

In considering the effect of the increased fee on pensioner amateur station operators it should, perhaps, be borne in mind that the increase represents only a very small proportion of the overall cost of maintaining an amateur station in terms of weekly contributions this amounts to only 12 cents.

The increased fees are not expected to fully reduce the discrepancy between revenue and costs. I regret to advise, therefore, that the Government cannot continue to subsidise the administration of amateur radio stations to the extent that it has done over recent years and the way is not clear, therefore, to reduce the new fee of $12.

Yours sincerely,
R. Bishop

Lieutenant Colonel J. McL. Bennett,
Public Relations Officer,
The Wireless Institute of Australia
Executive,
P.O. Box 150,
TOORAK, Vic., 3142

SUNSPOT BULLETIN

Thanks to the Swiss Federal Observatory Bulletin for 30th Nov., it is noted that the first spot of the new cycle was observed on 15th November. The smoothed mean for May 1974 was given as 36.4, the provisional mean for Nov. '74 was 23.9 and the smoothed monthly predicted sunspot numbers for the next 6 months were given as Dec. '74 — 29, Jan. '75 — 27, Feb. — 25, Mar. — 24, Apr. — 23, May — 22. ●

Darwin Diaster Communications

John McL. Bennett, VK3ZA,
WIA Executive, Public Relations Officer

Christmas morning 1974, what would normally have been a happy day, dawned over Darwin, Australia's northern-most city, to show the carnage left in the wake of Cyclone "Tracy" in all her fury.

Hardly a building or structure of any sort had escaped the thrashing of cyclonic winds, which reached an estimated 160 knots. Most of the city's 40,000 inhabitants were homeless and, within the next few days, more than 28,000 of them were to be evacuated in the biggest air-lift in Australia's history.

In this, Australia's worst ever natural disaster, the total cost of property and equipment loss is still being calculated long after the event.

Darwin is remote, even in the vast continent of Australia where the people think little of travelling long distances — Darwin's help could only come from outside — from Sydney and Melbourne, 3,200 km away; and from Brisbane, Adelaide and Perth, all around the 2,700 km mark!

The remoteness of Darwin was emphasised by the near-total loss of communication facilities.

Darwin, normally well equipped with and well serviced by communication facilities, had lost her voice and contact with the outside world to tell of her plight . . . almost, but not quite, lost her voice.

Shortly after 1 a.m., Eastern Australian Summer Time, the last telephone call from the city was cut short — the OTC Telex link failed at 6.30 a.m. For the next three hours or so, little or nothing was heard. Then, an amateur operator's voice was heard from Darwin!

Bob Holland, VK8RR, having found his mobile gear serviceable, came up on 14 MHz and was the first known voice from the devastated city. This was around 9.00 a.m. EAST.

About the same time, Bruce Wilson VK3IG, a Technical Officer with Radio Australia at Shepparton, 220 km north of Melbourne, was calling "CQ Darwin" in the hope of ascertaining the status of "RA" equipment there, as the telex link with Darwin and Shepparton transmitters was "out" and all attempts to contact Darwin by other means had failed.

Bruce's call "CQ Darwin" was heard by HL6WI in Seoul, South Korea, who told Bruce that there was a VK8 on the band and that a cyclone had apparently hit Darwin. A quick call for Bruce from P29WB informed him that VK8RR was operating down on 14195 kHz . . . so contact was established on that freq . . . although it later moved down to 14175 kHz.

Bob, VK8RR, is the Manager of the OTC Coastal Radio Station, VID, Darwin and his concern was to get a message to OTC headquarters in Sydney to advise the present state of OTC communications in Darwin. This traffic was swiftly passed by telephone. Around 10.30 a.m. EAST, Bob was on his way to Darwin wharf with other OTC operators to establish CW communications with the Marine Operations Centre in Canberra using the radio facilities of the coastal trading vessel "Nyandra", anchored in Darwin harbour. This link was opened at 14.30 EAST using the call sign VID-2 . . . VID itself having suffered considerable damage in the cyclone.

Those amateurs known to have been on watch and operating on 14175 and 14195 kHz between 0.900 and 12.30 EAST were: VK3IG, VK3KF, VK3ZA, VK4YG, VK4DK, VK4GD, VK5SL, VK5NJ, VK5QX and VK6NA.

Doubtless, there were numerous others monitoring the frequency, as was the case throughout the entire operation, all of whom were ready to give assistance if required.

Nothing further was heard from VK8RR after 10.30 EAST, as Bob was flat-out with the operation of VID-2.

As that circuit, Army RTTY and other links came into service around midday, the picture of Darwin's plight began to emerge at the headquarters of the Natural Disasters Organisation in Canberra.

At 5.30 p.m. (0630Z . . . from this point in the story all times will be quoted in "Zulu" . . . GMT . . . showing in date time group style e.g. 250630Z . . .).

So . . . at 250630Z . . . the next amateur voice was heard.

Trevor "Slim" Jones, VK8JT, operating an FT101 mobile, about 8 km from the centre of Darwin, called "Mayday" on approximately 14114 kHz and the call was heard in Melbourne by Ken, VK3AH, who immediately advised the Victoria Police communications centre "D24". Within minutes, the police were at Ken's Mooroolbark home at the foot of the Dandenong Ranges, some 40 km east of Melbourne.

By 250645Z the police had declared 14114 kHz "a police priority channel for emergency traffic only". A telephone link was established by Ken's 'phone with "D24". This 'phone link was later supplemented by a police UHF radio link. In Darwin, "Slim" had informed the Police Commissioner of the existence of the amateur radio emergency circuit with the Victoria Police in Melbourne and, as a result, a police walkie-talkie radio was installed adjacent to "Slim's" gear to complete the hook-up between the two police organisations.

The Victoria Police established com-

The scene at Disaster Control, D24, where members of WICEN provided the link from the HF stations to the Victorian Police, and control for the VHF stations at Tullamarine and the Commonwealth Centre.

munication with the Natural Disasters Organisation operations centre in Canberra and so the chain was completed and police information began to flow over the amateur radio circuit out of Darwin.

Word quickly spread through the amateur world and soon an effective net was established which allowed for relay facilities between Darwin and Melbourne and Cairns and Perth. The need to QSP was vital to the success of the circuit as 14 MHz, although quite good between Melbourne and Darwin for a large part of the day, couldn't be relied on for the whole 24 hours!

The stations involved in primary relay and logged in the first 30 minutes of operation at VK3AH were: Ted VK4YG, Terry VK2BTS/4, Mount Isa, Craig VK8CW, Alice Springs, Owen VK8OM, 270 km from Darwin, Bert VK5AH and Ian VK5QX, both of Adelaide.

Three overseas stations also played a significant part in relay ops . . . VR4BD; 9M2ML RAAF Butterworth, Malaysia; and HL9WI in South Korea.

HL9WI, in the first three or four hours after VK8JT commenced operation could read Darwin clearly and QSP traffic to VK3AH. Most useful to the relief operation was HL9WI's ability to both receive and transmit on service aircraft frequencies . . . this enabled him to relay the Darwin weather report, sent by VK8JT, to the first RAAF C130 Hercules transport inbound with support for the city.

If you have a story to tell about Amateur involvement in the aftermath of the Darwin Disaster, please write to:
AMATEUR RADIO STATION VK3ZA,
P.O. Box 134,
Mount Eliza, 3930

In those first few hours, the "net" grew to an estimated 200 participating stations with unknown hundreds listening on the frequency as "Slim" and his assistants, Gary VK2BNN/8 and his XYL Wendy, who were on holiday in Darwin, passed police traffic tirelessly. This was no easy task as "Slim" was operating under great difficulty with make-shift antenna slung-up with string!

At 251400Z, seven and a half hours after Ken, VK3AH commenced operation, he was joined by Bruce, VK3UV and these two alone kept going with meals and coffee brewed by Ken's wife Bett, continued to control the net and handle police traffic for a further 18 hours. At that stage, 260643Z, both men were very tired and the operation was now very large. Ken was notified that the Wireless Institute Civil Emergency Net was ready to commence operation. Ken signed clear at 0647Z and WICEN took over a well-oiled machine which was to steadily grow in complexity and continue operating for another three and a half days and nights.

Initially, WICEN control station was VK3AUP, operating from Templestowe, with a VHF FM link utilising the 2mX channel 1 repeater between there and police headquarters at Russell Street. Andrew Moffatt VK3FJ acted as co-ordinator in overall control. VK3LM, at East Ringwood later carried on the same function of VK3AUP using the same facilities.

VK3AUP continued to handle police and Natural Disasters Organisation (NDO) traffic until 270640Z when advised by NDO through VK3ZA that PMG circuits to Darwin were almost fully restored for NDO purposes and that there was no further requirement for WICEN net for official purposes. NDO had closed their radio link in Canberra with WICEN around 270100Z but asked WICEN to remain on standby in case there was a need to reactivate the net at short notice. From the official close-down time of 270800Z for NDO traffic, WICEN took on a new role.

Although NDO traffic had ceased, the Victoria Police considered that there was need for the net to continue in order to handle the volume of traffic arising from the evacuation of some 28 to 30,0000 people from Darwin.

At 280445Z, VK3AUP changed callsign to VK3WIA, the official call sign of the Executive of the Wireless Institute of Australia. Coincident with that change, VK3WIA called "CQ CQ VK, CQ VK" . . . with a message from WICEN Sigcen Melbourne. ". . . . All stations operating into Darwin . . . PMG has authorised third party traffic in and out of Darwin may be accepted and passed to this station from VK8 stations or interstate relays or to local Police Headquarters for onward transmission to D24 Melbourne. Priority is to be given to sigs out of Darwin unless vital . . . ."

Within an hour, the official Wireless Institute callsign of every State in Australia was on the air, together with about another 20 stations in major provincial areas. These stations handled and relayed messages of a welfare nature until the closure of the net at 291300Z — on the fifth day of operation.

Tribute must be paid to all those amateurs who operated and staffed the repeater links on 2 mX FM between WICEN HF control stations and D24, the second repeater link between D24 and Tullamarine airport and the simplex net between Tullamarine and the Commonwealth Centre in the City of Melbourne. Without these links, much of the traffic handled on the Darwin-Melbourne circuit would have been meaningless or wasted.

Nor can one find words to express the gratitude due to the many amateurs throughout the country who so willingly made available their equipment to be sent to Darwin to supplement the meagre resources there or for use in the VHF nets.

Behind every amateur involved there stood the support of XYLs, YLs and Mums without their unflagging efforts, be it in Darwin or wherever, many an operator may have flagged!

Thank you ladies, one and all.

There is a host of stories and anecdotes yet untold about this disaster and there are countless names and callsigns richly deserving of a place in the history of this communications challenge.

For these sins of omission, please forgive the historian at this stage.

As more and more information comes to hand, the full story will take shape, thus enabling us to publish, in due course, the complete history of communications with, within and from Darwin in the aftermath of Cyclone Tracy.

All that has been attempted here is to chronicle the key points of the saga of restoring contact with Darwin. The author would appreciate any information which readers may care to add or amplify, whether it concerns amateur radio or other forms of communication . . .

We, the amateurs of Australia, capably assisted by the brotherhood of fellow amateurs outside the Commonwealth, fulfilled our emergency role of providing a replacement and backup support for the normal facilities of the Australian Post Office . . . . and in the words of a police Inspector in Melbourne ". . . a good job well done".

However, we were only a part of the "big picture" in providing emergency communications and our part, with your help, will be told, along with that of all the other agencies and organisations involved, in a later edition of "Amateur Radio". ●

The Shack

Alan Shawsmith, VK4SS

Maybe it's carpeted, rich in decor
Or humbly furnished and bare of floor.
Spacious and specially made
Or a tiny room, downstairs laid.
It could house gear worth dollars 10K;
The sky-hook, a reaching phallic array
Or is there simply a rig QRP,
Working an LW or inverted 'V'?
Do trophies and merits adorn the wall
Or is there no space for cards at all?
Maybe it's built up high in a tree.
There are such places known to be—
—or is there only to be had,
A cellar in which the air is bad?
Does it stand on a hill or country glade
Or deep in a slum in eternal shade?
—or have you as a last resort,
Converted a corner of the carport?
No matter what or where it may be,
It's THE one place where a man is free.
It's THE SHACK — the Ham's Holy Pad,
Where pleasure unhindered is to be had.
Who cares a jot if it's tidy or bright,
So long as the person in it, feels right.
It's the Den, wherein you can do,
What the spirit moves the fancy to—:
Chase rare DX or call a CQ,
—or simply give the rag a good chew.
And if the bands are dull or dead,
Work on some homebrew job instead.
It's the Inner Sanctum, so shut the door,
And the daily 'rat race' is no more.
Switch on the rig, spin over the dial,
And just for an hour or longer while,
In this Castle the Ham is King.
Here, from the tones, voices ring,
to come and talk, to QSO
With friends, whose hobby all do know,
Has no distinction to embrace
Any creed, politics or race.
A society egalitarian,
Of Joe, Nick, Karl, Ivan, Sven or Ben.
The SHACK — that imperative territory,
Where I am a Ham and I am me. ●

20 Metre Quad Tuning Made Simpler

Harry Capsey, VK2OQ
58 Eldeton St., Chester Hill, N.S.W. 2162

Many amateurs have difficulty in finding a suitable power source for adjusting a quad antenna. The author used 70 ohm co-ax coupled by a 2 turn link to the coil of a GDO.

A simple SWR bridge using a 50 uA meter was used in the line and this gave ample sensitivity. The circuit of the simple indicator is shown in Fig 1.

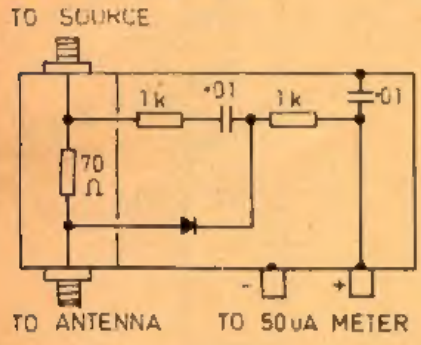

FIG 1 SIMPLE SWR BRIDGE 70 Ω

Leave the meter leads long and the meter can be read outside the shack, or through field glasses from the tower or pole (even longer and you could have the meter next to you! — Tech. Ed.) All that is required is to slide the gamma bar along approximately 3 feet, then adjust the 100 pf capacitor. This can be a close spaced capacitor small enough to fit in a small plastic container for weather proofing. If metal acts as a shield, this also makes earthing to the lower centre of the driven element easy. A coaxial connector can be used for the 70 ohm cable. The rough layout of the beam and tuning is shown in Fig 2. If the SWR is not to minimum or very close to a pure resistive 70 ohms, re-adjust the Gamma Bar and Capacitor.

Note:—For those wanting a 50 ohm resistance on the Quad, simply replace the 70 ohm resistor in the bridge with one of 50 ohms.

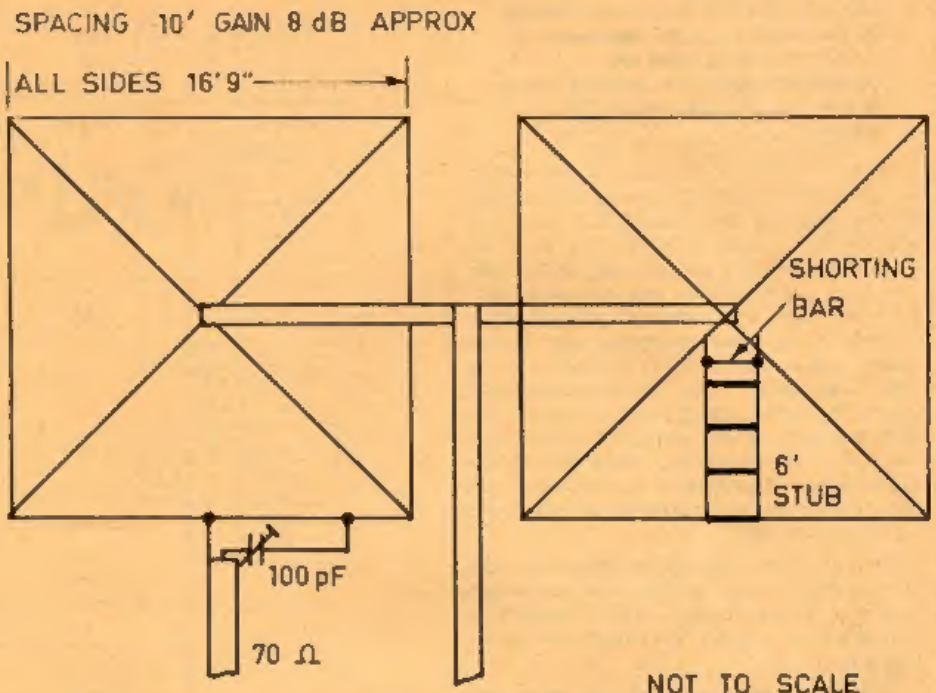

FIG 2 GENERAL DETAILS OF QUAD

TUNE UP METHOD

Set GD Oto 14.150 MHz, adjust 2 turn link to give a full scale reading on a 50 uA meter. With the quad lead disconnected, connect a terminating resistor of 70 ohms to load the co-ax terminal. The bridge meter should now read zero. Without touching anything, except to replace the 70 ohm terminating load with the antenna 70 ohm cable to Gamma bar and driven element, adjust length of Gamma match and 100 pf capacitor for bridge meter reading of zero. Leave set-up as is and rotate the beam with the reflector facing a dipole 10 feet high and as far away as possible.

With the 70 ohm feeder at the end, insert the meter with a diode across the line, and tune the reflector stub shorting bar for a minimum signal on the reflector. Repeat above adjustments to ensure accuracy.

RESULTS:

Back to front ratio — 6 "S" units, ends approx. 2 "S" units. Lobe spread approx. 45-50 degrees.

These are the owner's figures with the antenna only 20 feet high.

Note by the Technical Editor:

If the test dipole cannot be placed say, 50 feet or more from the Quad, then a small dipole (say 3 feet per side) could be used closer in. A diode should be connected in series with the feedline and bypassed with a 0.01 uF capacitor in the feedline side so that the meter sees only DC. ●

A Keyer for VK3RTG

Roly Roper, VK3YFF
15/10 Brook Street, Hawthorn, 3125

The design and circuitry of the keyer for the VK3 two metre beacon is discussed. A novel approach to the design to save on components and an extensive list of references are features of this article.

Late in 1972 the author visited the station of Gil Sones VK3AUI. During the course of the evening the discussion turned to the keying system used at the Victorian 144.7 MHz beacon at Vermont, Melbourne. The system then in use was an optical disc encoded with the call-sign rotated by a 1 RPM motor and operating the keying relay. This system suffered the usual problems associated with mechanical-optical discs. The code timing tended to be sloppy with the dahs varying from two dits to four dits long. The encoding discs had to be replaced at roughly two monthly intervals and had to be photographically produced and re-produced

As a result of this conversation, the Victorian VHF Group of the WIA requested that the author design and construct a fully electronic keyer to replace the existing system.

After exploring the methods used by others in this field it was decided to try to economise on matrix space as far as possible. Certain basic characteristics of the Morse code were used to achieve this end. This keyer differs from most others in that it uses a variable clock rate to optimize matrix usage. Roughly a 60 per cent saving can be made in matrix space for a given message using a variable clock compared with a fixed clock. Use is made of the fact that every morse character is followed by a space at least one dit long. This information is made part of the circuit external to the matrix, thus reducing by one bit, for each character stored, the number of bits needed to be stored. The second important basic relationship is that a dah is three times as long as a dit. If the stored dahs are generated by an external timer (monostable multivibrator) then only one bit need be stored for each dah rather than three, giving a saving of two bits for each dah stored.

Referring to the block diagram it can be seen that the keyer consists of two inter-locked loops.

The first loop is through the four monostable multivibrators (74121s). These monostables form a two state oscillator in which one of the states is fixed and the other is variable. The fixed part consists of the dit space mono and the variable part is selected by the counters and matrix and may be dit, dah or two dit space.

The path of the first loop is through the dit space mono, along the "recycle" line and through whichever mono is selected by the matrix and back to the dit space mono via a combining gate.

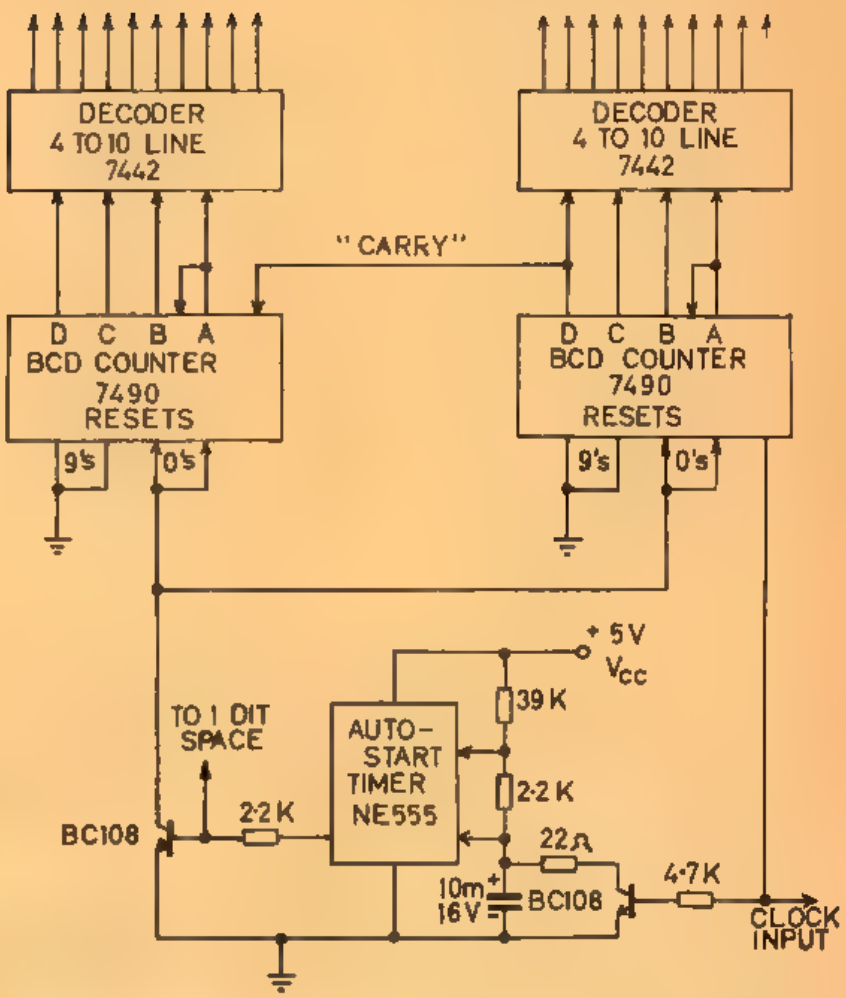

FIGURE 2 COUNTERS, DECODERS AND AUTO-START CIRCUITS

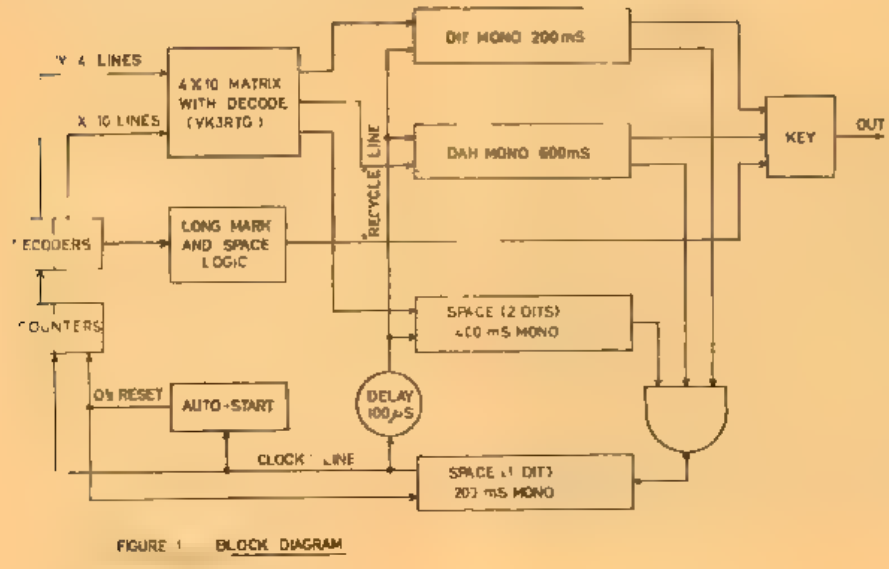

FIGURE 1 BLOCK DIAGRAM

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Measure ... SWR ...

... under ... $48.50 ...

SWR Meter	
Type	Directional Coupler
Ratios	1 : 1 to 1 : 10 & ∞
Frequency Range	3 MHz to 200 MHz
Impedance	75 ohms & 52 ohms
Full Scale Minimum Power	50W at 3.5 MHz 15W at 7 MHz 5W at 14 MHz 2.5W at 21-28 MHz 0.5W at 50-144 MHz
Power Meter	
Type	Through-Line
Power Ranges	0-200W 0-2kW at 3.5 MHz 0-20W 0-200W 0-2kW at 7, 14/21 MHz 0-2W 0-20W 0-200W 0-2kW at 28 MHz 0-2W 0-20W 0-200W at 50-144 MHz
Accuracy	±15% at SWR ... Center
Safety Rating	2kW at SWR 1 : 1 150W at SWR 5 : 1 200W at SWR 3.0 : 1
Meter	50uA DC
Connectors	Jeff Type SO-239
Dimensions	76m/m high X 110m/m deep X 220m/m wide (3" high X 4-3/8" deep X 8.5-8" wide)
Weight	1,250gr (2.8 lbs)

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Here is our first computer listed pack of single ended electros. 42 top quality caps based on usage (not the useless values). Check what you get:
10V 2 x 33 uF
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You see it's not a random pack but based on computer usage listing. CAP1 pack has 42 electros for only $7.90. Normal value is around $12.50.

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TTL 'A' pack has a Datalit 707 display with 7490 BCD counter and 7447 decoder driver and forms the basis of a single decade counter at only $6.90
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Size UB3 12½ x 8 x 4 cm $1.65

GRAB THESE

R.F. POWER TRANSISTOR SPECIAL
Huge pre-devaluation purchase of R.F. power transistors from Solid State Scientific enables us to REDUCE prices on these devices. Fully guaranteed premium quality devices at savings up to $2.00 each.
2N5589 7W was $5.50 NOW $4.90
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Set of 3 to give complete chain (see Kits) was $22.50 NOW [illegible].
Get together with your friends (or club) bulk purchase and share the savings.

ELMENCO r.f. MICA TRIMMERS Ideal for H.F. and VHF circuits. American made using India Ruby Muscovite mica for the dielectric. 250V DC working and will naturally take RF current.

		1-9	10 up
Type 402	1.5 to 20pF	80c	48c
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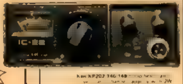
ICOM IC22 SEE E.A. DEC. 74 $199

Icom IC22 144-148 MHz FM transceiver has power output of 1W and 10W. The 22 channels all have separate trimmers ... Features ... Tx/Rx ... MOSFET ... and with 6 helical filters ... mount. And ... Supplied ...

... Normal price is $245.00 ... but we have a shipment coming in at $199.00 (P & P ...) ... crystals are also available at $9.00 a pair as follows:

... 4? 45	146	146
48 ...	146.4	14 00
	14 ...	4...



Ken KP202 146-148 ... 2W ... P 259 adaptor plug supplied. Operates on penlight cells. Crystals included for 3 channels. A very popular unit at $160.00 (P & P $2)

Crystals included as follows, please specify:

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1 Channel 50	146.5	146.5
2 Channel 47-45	146.1	46.7
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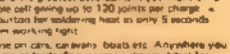
	Tx	Rx
1 Channel B	146.00	146.00
2 Channel 1	146.1	145.6
3 Channel 4	146.4	145.9

Special KCP-2 NiCad battery set and charger with 10 cells to suit the KP202 available at $35.00



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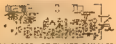
KITS



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Please Note: Instructions for conversion to 52MHz are available on request. However a separate kit is not available.

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NOTE: All meters should be sent by road freight to avoid damage.

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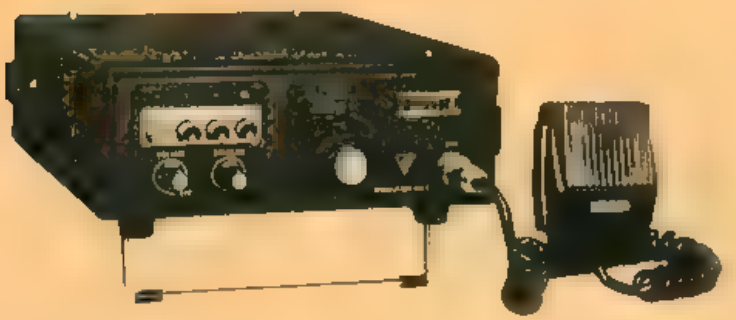
$449

Sigmasizer-200R



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$448

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A new concept in a 2 metre FM transceiver is the FT-2 Auto. The unique Auto Scan circuit with priority channel search places the FT-2 Auto in a class by itself. The versatile capabilities of this transceiver are achieved through the use of advanced digital logic circuits. The Auto Scan circuit monitors your favorite 8 channels at the rate of 20 channels per second with indicator lights on each channel. It automatically locks upon receipt of a signal on any channel.

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Mode: FM
Frequency Stability: ±0.001%
Antenna Impedance: 52 Ohm unbalanced
Circuitry: 30 Transistors 23 Diodes 4 IC, 5 FET
Power Source: 13.5 VDC
Power Requirement: 0.4 A receive, 2.2 A transmit (DC)
Size: 190(W)x70(H)x220(D) m/m
Weight: 2.5 Kg.

RECEIVER

Sensitivity: 0.3 µV for 20 dB quieting
Selectivity: 15 KHz at 6dB 25 KHz at 60dB
Audio Output: 2.5 Watts at 4 Ohm

TRANSMITTER

RF Output Power: 1 or 10 Watts
Spurious Radiation: 60 dB better than 60 dB
Deviation: ±5 kHz nominal

FP-2

AC POWER SUPPLY FOR HOME OPERATION

The FP-2 can be used with the FT 224 or Sigmaster 200R supplying regulated 13.5 V DC. Provision has been made for installation of optional colloid batteries which are automatically charged and connected when the AC supply stops. The colloid batteries last approximately 10 hours. Contains a 80 x 120 m/m speaker

Output: 13.5 V DC, 2.2 A maximum.
Power Requirement: 100/110/117/200/220/234 V AC, 50/60 Hz 35 Watts
Size: 160(W) x 120(H) x 230(D) m/m
Weight: 4 Kg

your favorite channel. Automatic final protection against high VSWR is another total performance feature of this outstanding transceiver

Specifications

GENERAL

Frequency Range: 144 to 146 MHz or 146 to 148 MHz
Number of Channels: 200 (10 KHz intervals) Simplex and ±600 KHz TX offset for Repeater operation
Mode: FM
Frequency Stability: ±0.001%
Antenna Impedance: 52 Ohm unbalanced
Power Source: 13.8 V DC (negative ground)
Power Requirement: 0.45A receive, 2.2A transmit
Size: 220(W)x80(H)x230(D) m/m
Weight: 3 Kg.

RECEIVER

Sensitivity: 0.3 µV for 20 dB quieting
Selectivity: ±8 KHz at 6 dB, ±16 KHz at 60 dB
Audio Output: 2 Watts at 4 Ohm

TRANSMITTER

RF Output Power: 1 or 10 Watts.
Spurious Radiation: 60 dB minimum.
Deviation: ±5 KHz nominal

$79

Individual lock-out buttons enable you to eliminate any undesired channels. To transmit on a channel being received, a momentary depressing of the mike button locks the transmitter to the receiver. A priority circuit may be activated to check your favorite channel every two seconds. A built-in front panel switchable tone burst generator is included for repeater actuation. Only the YAESU FT 2 Auto offers you such a unique two meter transceiver, complete with cables, mounting bracket, crystals for six popular channels and microphone

Specifications

GENERAL

Frequency Range: 144 to 146 MHz or 146 to 148 MHz.
Number of Channels: 6 (5 supplied, B, 50, 1, 2, 3 & 4).
Mode: FM.
Frequency Stability: ±0.001%.
Antenna Impedance: 52 Ohm unbalanced
Circuitry: 61 Transistors, 94 Diodes, 7 IC, 3 FET.
Power Source: 100/110/117/200/220/234 VAC 50/60 Hz or 13.5 VDC
Power Requirement: 30 Watts (AC), 0.5 A receive, 2.1 A transmit (DC).
Size: 210(W)x95(H)x270(D) m/m.
Weight: 4.2 Kg.

RECEIVER

Sensitivity: 0.5 µV for 20 dB quieting.
Selectivity: 7 KHz at 6dB, 16 KHz at 60dB nominal
Scanning Rate: 20 channels/second
Scan Delay: 0.3 second
Priority Channel Check: Every 2 seconds
Audio Output: 2 Watts at 4 Ohm

TRANSMITTER

RF Output Power: 1 or 10 Watts
Spurious Radiation: -60dB better than 60dB
Deviation: ±5 KHz nominal

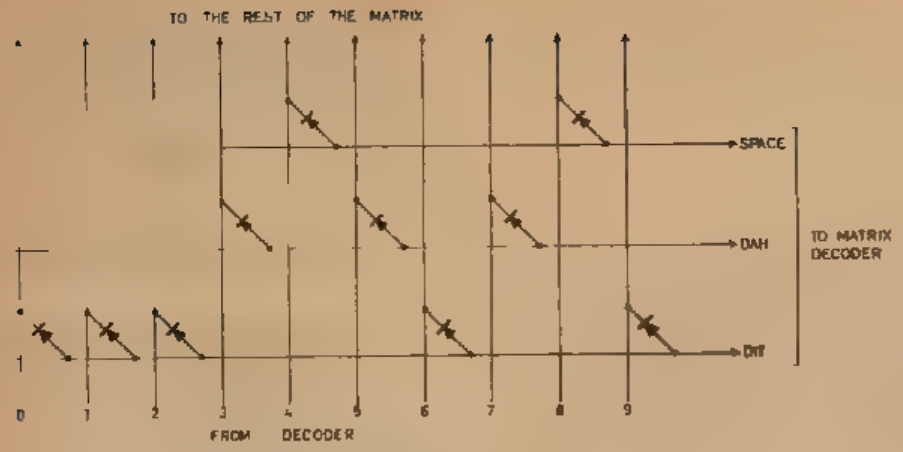


FIGURE 3 MATRIX WIRING FOR VK3RTG

The second loop controls the addressing of the matrix and passes through the dit space mono, the counters and decoders, the matrix, the selected mono and back to the dit space mono.

AUTO START

The auto start is required to provide clock pulses in the event of a power failure as it is most likely that the counters (7490s) will set up into an "illegal" state when power is restored. The decoders are designed not to give any output unless the input is a binary number between zero (0000) and nine (1001) inclusive. Therefore, no number is presented to the matrix which consequently has no output. In this case the keyer would never start, hence the need for the auto-start. The auto-start consists of a timer (NE555) which is set to a time of about one second. Normally this timer is unable to time out as it is reset by each clock pulse into the counters which should occur far more often than one per second. The timer times out and a reset pulse is fed to the counters which resets them to zero (0000) which is a decoded state which allows the keyer to start. The auto-start timer is arranged so that in the absence of clock pulses it will continue to produce reset pulses (i.e. until the keyer starts).

COUNTERS AND DECODERS

The counters are binary counters internally "moded" to only count to nine (1001) then reset to zero (0000). The decoders are arranged to decode the binary coded decimal (BCD) into one-of-ten lines to drive the matrix and matrix decoding (7442s).

THE MATRIX

The matrix consists of ten lines crossing rows which are in groups of three. The lines and rows are interconnected with germanium diodes (for lower forward voltage drop) as required for the message.

Fig. 3 shows the first row which has been encoded with the first part of the callsign VK3RTG. In the circuit shown, "VK" and the first dit of the "3" are generated. The matrix is on a plug-in card for easy code changing.

MATRIX DECODING

The four groups of three are selected (7402s) then routed to the keying monostables (7453s and SP317A) as shown in Fig. 4.

The expander input on the SPACE gate is used to run the counters around to the start so that the code may be sent again.

MONOSTABLE MULTIVIBRATORS

When a monostable is selected by taking its A input low, its output Q goes high for its set time. In the case of the dah mono, its Q Output goes high for 600 ms, then it reverts to its resting state. The recycle line is used to retrigger a monostable via its B input if it is required for consecutive characters; the 100 micro second delay prevents false retriggering if a different character is selected.

A gate (7410) is used to provide three long "key down" periods so that the keyer may operate as a beacon.

POWER SUPPLY

The power supply required by standard Transistor Transistor Logic (TTL) is 5 volts + or —5 per cent and this is provided by a bridge rectifier and an integrated regulator (7805).

As the keyer was intended to operate in close proximity to a high powered 144 MHz transmitter, extensive precautions were taken to stop RF getting into the counters or gates. Mains borne RF (and other) interference is filtered by a combination of lossy ferrite beads over the incoming mains cable and a capacitive filter. The logic and power supply were built in separate compartments, and all leads from the power supply compartment into the logic compartment pass through feed through capacitors. The entire unit is housed in a screened case.

Due to the need for a high order of reliability, Light Emitting Diodes were used

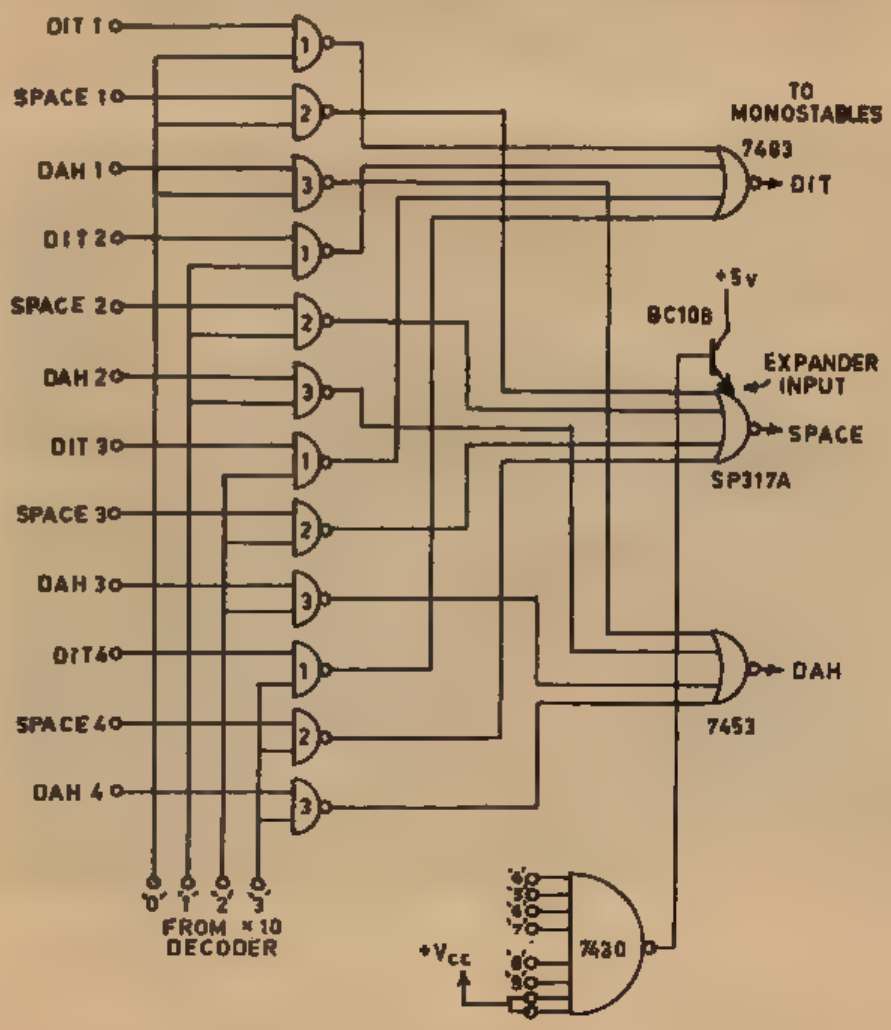


FIG.4. MATRIX DECODER CIRCUIT

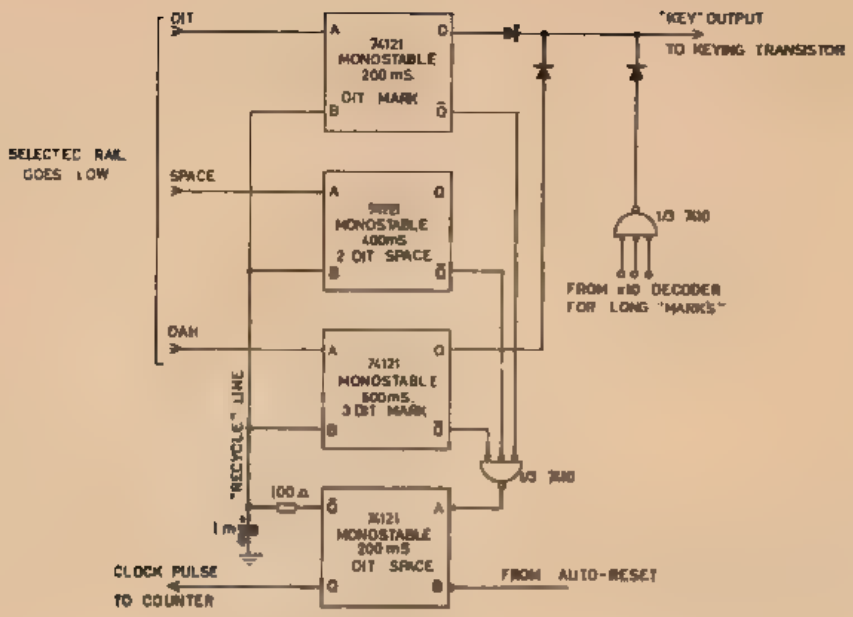


FIGURE 5 MONOSTABLE MV CIRCUIT

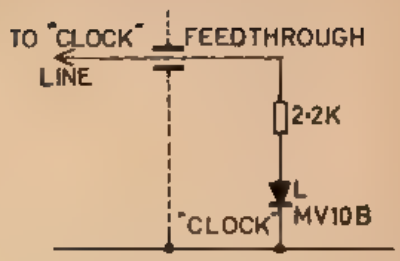


FIGURE 7 CLOCK INDICATOR

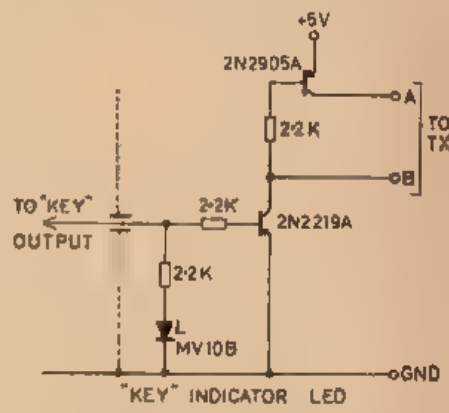
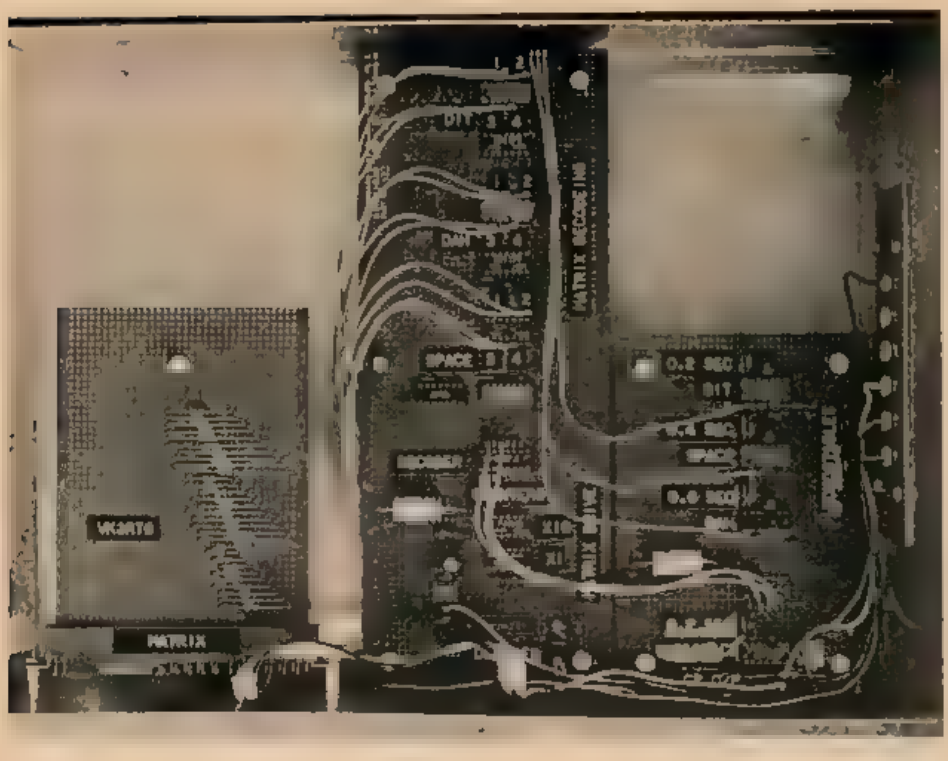


FIGURE 8 KEYING CIRCUIT



Interior view of the keyer with the various stages clearly labelled.

as indicator lights as they have a MTBF of about 100 years.

OUTPUT

Fully solid state output was employed with a current sink being first installed (B) and later a current source (A). Refer to Fig. 8.

PERFORMANCE

The unit first ran in early September 1973. A faulty two dit space mono was located and replaced and the unit "soak tested" for some three weeks. It was then placed in service at VK3RTG and has performed faultlessly since.

BIBLIOGRAPHY

1. An Introduction to Digital Electronics Theory, Instruments and Computers. J. Rowe. Pub. Electronics Australia.
2. Radio and Television Engineers Reference Book Newnes J. P Hawker Ed 1960. Ch. 7-32.
3. A Keyer for GB3VHF, by G. E. Goodwin G3MNQ. Radio Communication, June 1970, P 336
4. Digital Logic Devices, by N. Poe WA6KGP. QST, July, 1966. P 17
5. Integrated-Circuit Flip-Flops, by N Poe WA6KGP. QST, February, 1971. P.31.
6. Programmable Digital Keyers, D. McArther VK3KK Amateur Radio, May, 1973. P.13 et seq.
7. Combined Keyer and Audio monitor, by M. Jahn K2ERI QST, September, 1969. P.32.
8. The "Yet Another Keyer", by R. G Wheatland G3SZW. Radio Communication May, 1973. P.326
9. P.E.K. (Perfect Electronic Keyer), by W. O. Hamlin W6ENU, Radio-Electronics, November, 1969. P 69.
10. Spakey, a Controlled-Space IC Keyer, by K. Stone K8ORD. QST, December, 1970. P.39.

Try This

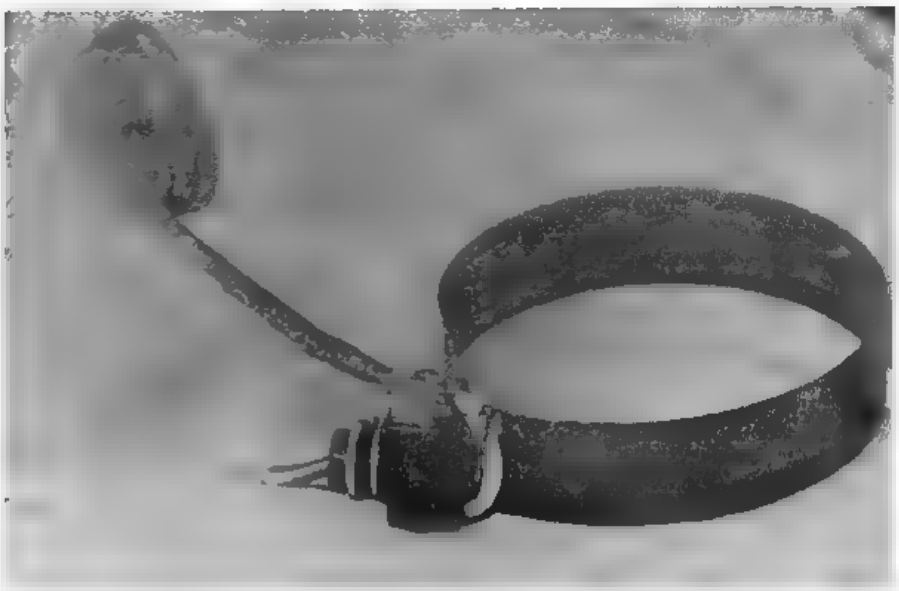
with Ron Cook VK3AFW and Bill Rice VK3ABP

"LOOK MA, NO HANDS"

A boom microphone for mobile or VOX operation can be made using a 290 mm piece of 0.42 x 24 mm clock spring as the basis of a collar clip. A piece of light welding rod is silver soldered to one end of the spring. This becomes one lead to the rocking armature microphone as a loop in the end attaches to a mike terminal and supports it. The other conductor is taped to the rod. A toggle send/receive switch mounts on the clip via a silver soldered loop. It can easily be reached by feel alone making it useful for night time operation. The unit takes half a second to put on or take off, yet doesn't strangle or get in the way.

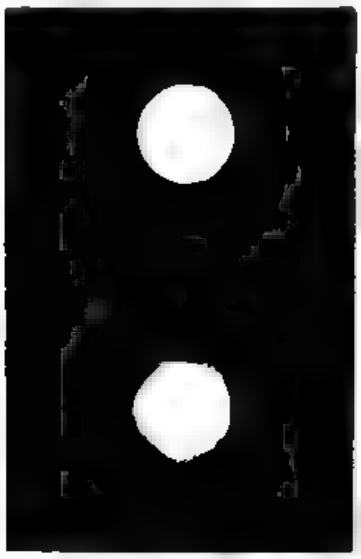
The photos (via VK3GK) showing the unit both in use and lying on the seat of the car illustrate the method of construction.

VK3AKL



AVOIDING "PENTAGONAL" HOLES

Not all hams possess a set of classic punches and therefore have to employ other methods to make large holes in panels, chassis etc., and at times there is no room to fit a chassis punch anyway, particularly in a piece of already constructed equipment.



Very often, holes from say ⅜" to ½" are required, and we are tempted to use plain ordinary twist drills, with the inevitable result — "ugly pentagonal holes" — and this is particularly true in thin sheet metals.

Why they insist on going that way I do not know, but they most certainly do.

Many ideas have been put forward to overcome the problem, such as sharpening the drill somewhat flatter than the normal 110 degrees, or sharpening the drill to provide cutting blades at the edges etc. The result being that the drill is no longer of use for normal work, and drills of these sizes are not cheap.

There is a very simple and tremendously effective way out of the problem, and it requires no special sharpening or spoiling of the drill.

All that is required is a small piece of rag, calico, shirt, etc.

Method: First mark the position of the required hole, then drill a small pilot hole — say 3/32" or 1/8". Take a small piece of cloth about 3½" to 4" square and fold over once each way, giving four thicknesses of material.

If you have a drill press, first make sure the point of the large drill centres on the pilot hole when the handle is pulled down.

Keep the job steady and place the folded rag over the pilot hole; pull the drill handle down and drill as usual. You will be pleasantly surprised to see a nice clean cutting come spiralling up through the cloth.

A sharp penknife, or chisel, will easily remove the very thin cutting on the lower side of the hole — a clean round hole.

I have drilled ½" holes in 20 S.W.G. aluminium and 24 S.W.G. hard rolled copper sheet with equal success, and with no soul-shattering noise and vibration. Larger holes have not been tried for the very good reason that ½" is the largest drill which I possess.

I do not have the slightest idea why the idea works as it does, and the gent who first put me on to it had no idea either, nor did the very old craftsmen who told him.

If you do not have a drill press, you can still use a hand or breast drill, or electric drill, provided you make sure the drill is centred over the pilot hole when you have applied the folded cloth.

I have made ½" holes in existing equipment with no trouble of any kind.

Alex Slight, VK2ZA

Continued from page 18

11 The Five Finger Keyer, by T. H. Turrin, W2IMU QST, January, 1971.

12 The Saga of the Bug, by K. Gillespie VK3GK Amateur Radio, September, 1973.

13. Recent Equipment — The Curtis EK-384 Mnemonic Electronic Keyer QST, March, 1971.

14. An Automatic Code Sender, by M. Grossman. Electronics Handbook, Page Publications P/L, Sydney P.19.

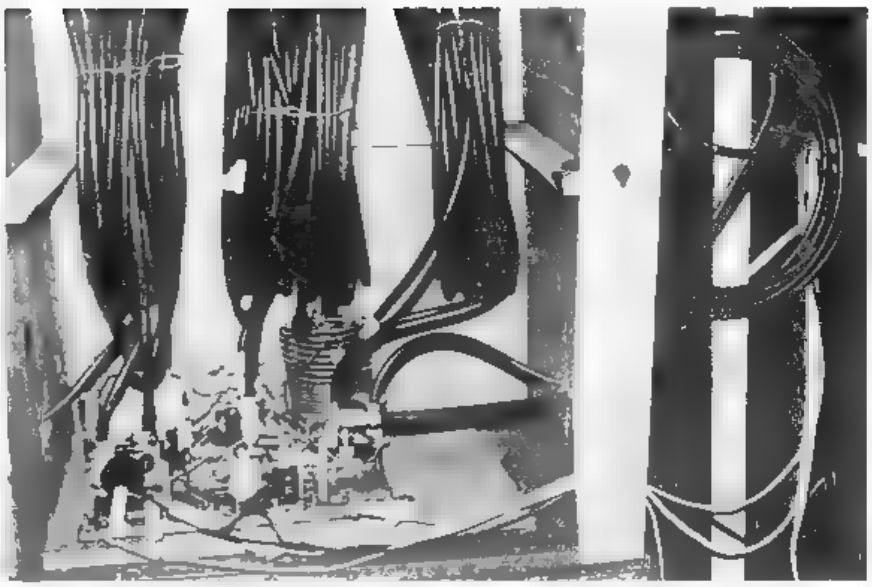
15. Morse Code Keyboard uses ICs, novel encoding system, by A. D. Helfrick W2BLA. Electronics Australia, November 1973. P.47 (Reprinted from an unknown issue of CQ.)

16. Proposals for a national beacon philosophy, by R. Harrison VK3ZTB. SUP, October, 1973. Vol. 2, No. 8. P.12.

Phased Vertical Antennae

Bruce Mann VK3BM
P.O. Box 24 Sale [illegible]

This article describes the features of the 3 verticals in the background of the cover picture of AR in October 1973.



Each of these verticals is 75 feet high and they are in line on U.S.A., one quarter wave apart on 3.675 MHz (66 feet 9 inches). The two outer verticals are therefore one quarter wave apart on 1837 kHz. The verticals are insulated at the base by hefty disposals ceramic insulators, and there are 30 radials of old copper wire buried from the base of each vertical to the boundary of the QTH 150 feet x 100 feet block. The ideal of course, would be to have these radials much longer.

At the base of each antenna there is a weather-proof box containing a .00035 variable capacitor, a 4 inch diameter x 15 turn tapped inductor, and two 2 pole DC relays to switch either the capacitor or the inductor in series with the vertical. Seeing that the 75 foot height of each pole is a compromise between a quarter wave on 80 metres and a quarter wave on 160 metres, the series variable capacitor will tune the vertical to an electrical quarter wave on 80 metres, and the coil will load the vertical to an electrical quarter wave on 160 metres. It was found that the height of 75 feet when series tuned to a ¼ wavelength on 80 metres gave an impedance of approximately 52 ohms, thus a good match to the co-ax. It was a simple matter using an antenna noise bridge to place a tap on the loading coil to give a 52 ohm match on 160 metres.

Phasing: If antennas A, B and C are simultaneously fed with an equal amount of power through exactly equal feedlines (say ½ wave length for convenient tune-up) from the same transmitter, they will each put out an equal wave in all directions. But the wave from B travelling to the **left** will at the mid-point meet "head-on" an exactly equal wave from A travelling to the **right,** and so they cancel out.

Similarly, there will be cancellation between B and C, and a left-travelling wave from A will balance out a right-travelling wave from C. The resultant effect is that the power from the transmitter is concentrated into a sharp figure 8 pattern at right angles to the line of A, B, C.

If, in addition to the above hookup, an electrical **quarter** wave of co-ax is added to the feedline that goes to antenna B, and an electrical **half** wave to antenna C feedline, then we have the condition where the 3675 kHz wave has arrived through air to antenna B at precisely the same instant as the same wave from the transmitter has negotiated the extra quarter wave of co-ax, and arrived to add together and boost the wave from it. This greatly augmented wave then arrives through air at C simultaneously with the signal from the transmitter (delayed by traversing the extra half wave of co-ax) to cause a further boost, and so a strong signal in the direction A-C is obtained. Waves in the opposite direction clash with oncoming waves and so cancel out.

To reverse direction, all one has to do is to switch the half wave delay line from C to A.

The first attempt gave little gain and front to back ratio, but a visit from VK5PB was needed to discover the error. When the co-ax was properly fitted with connectors and everything tuned exactly with the noise bridge, it worked. Surprisingly, having got it so exactly tuned, we could QSY quite a deal without too much loss of performance.

A number of 12V DC heavy duty relays were made up from military disposals types, and switching arranged so that 4 directions and an omni-directional pattern were obtained on 80 and 160 metres as per chart.

At this stage in the testing, VK3QI/M circled the antenna at about 1 mile distance, and again at about 12 miles radius. The pattern obtained was very satisfactory, indicating 18-20 dB front-to-back, and gain 6-9 dB over the single vertical.

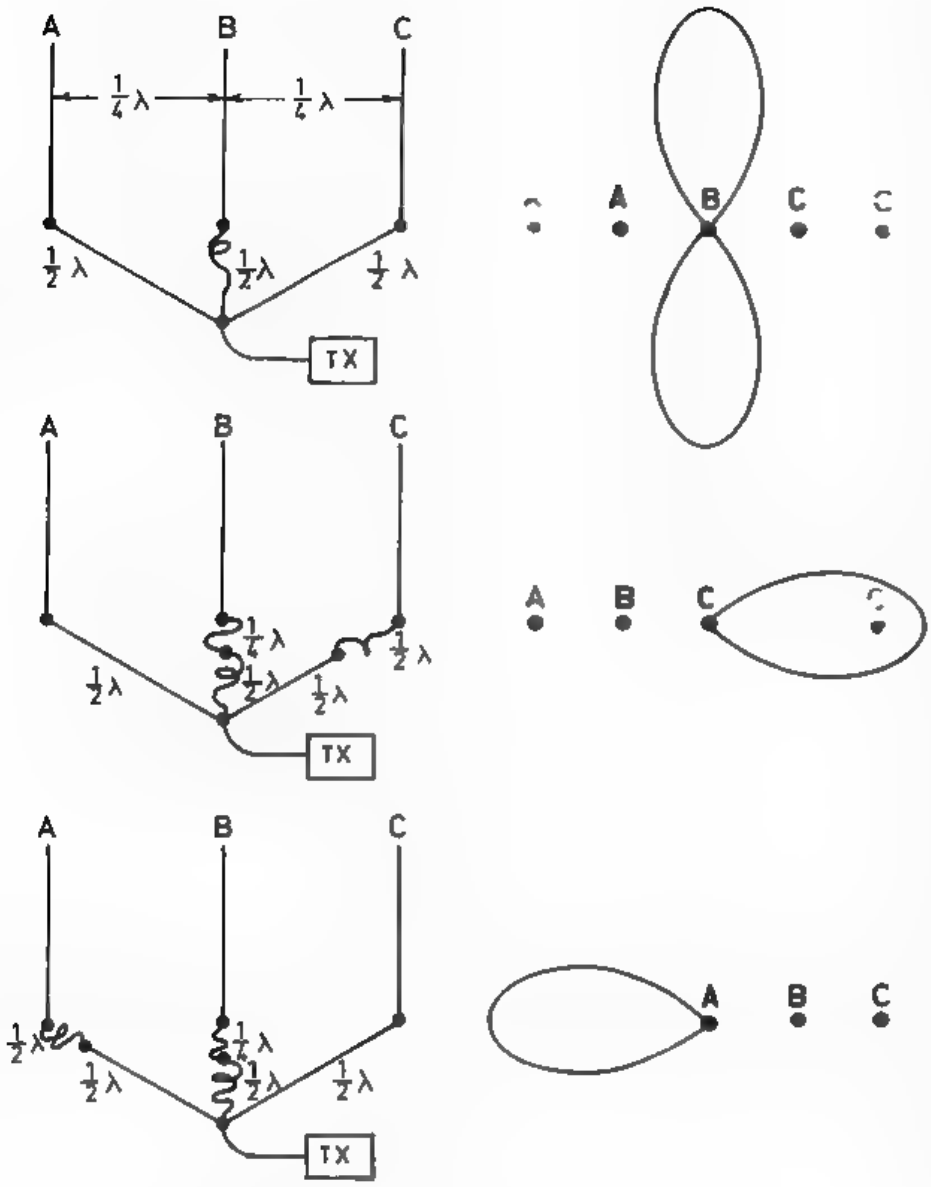
A few weeks later, performance and front-to-back ratio had fallen off seriously. A thorough overhaul of relays and a retune, and performance was again o.k.

Then weeks later, another tune up was indicated — no F.B. and no gain over the dipole! This repeated frustration led to a spate of reading and discussions with some of the famous antenna experts overseas and in VK. All this and a further temporarily effective tune up confirmed the growing belief that the trouble was in the "earth" — in fact literally the earth. There is not enough of it, and it is not the right quality. Although there are at least thirty copper radials around each vertical out to the fence boundary where they join a

RELAY SWITCHING

80 METRES	**ANTENNA A**	**ANTENNA B**	**ANTENNA C**
Omni Directional	Floats	Fed thru ½ wave length	Floats
North East	Fed thru ½ wave length	Fed thru ½ wave length plus ¼ wave length	Fed thru ½ wave length plus ½ wave length
South West	Fed thru ½ wave length plus ½ wave length	Fed thru ½ wave length plus ¼ wave length	Fed thru ½ wave length
NW/SE	½ wave length	½ wave length	½ wave length
160 METRES	**ANTENNA A**	**ANTENNA B**	**ANTENNA C**
Omni Directional	Floats	Direct	Floats
North East	Fed direct	Floats	Fed thru ¼ wave length 160 — (½ wave length 80)
S-W	¼ wave length 160 (½ wave length 80)	Floats	Direct
NW-SE	Direct	Floats	Direct

Note: Half wave co-ax delay lines on 80 metres used for ¼ wave length on 160. For convenience in tune-up, ½ wave of co-ax was used to each antenna base tuner — but exactly equal lines of any length would be o.k.



cable right around the perimeter of the "antenna farm". The problem is that the antenna farm is only 100 feet by 150 feet, and some of the radials therefore are only 15-18 foot long, and furthermore these shortest radials are in the direction where length is most important.

Some articles in U.S.A. journals and some hams contacted have commented on directional effects according to the disposition of the radials. Almost invariably where really good results have been regularly obtained with phased verticals, the soil has been flat and wet, and a great mat of wires has extended out to or beyond ¼ wave

Previous very successful use of a vertical on the unlimited space on a farm was obtained using ¼ wave radials 10 feet above ground. Here in Swan Hill the radials are of necessity buried, they are too short and the soil is exceptionally sandy and non-conductive, the average rainfall being less than 14 inches.

It was concluded that the problem is due to the short radials in sandy soil, in which the conductivity and therefore the tuning varies greatly with each rain or dry spell of weather.

Now for some comments on the performance when it did work. Strength 8 SSB reports were obtained from Europe, and 9 plus from U.S.A. and occasional reports from somewhat closer stations who were in the path of the beam of 9 plus 30, falling to strength 6 when the phasing was reversed.

It is believed that a similar set-up, with adequate radials would be very effective indeed, and in the four beam directions. It was surprising that the system is so sharply directive, and I believe that in most cases, the 3 verticals in triangular formation, giving 6 directions, would serve better

At a DX location better reports are usually obtained on the verticals or even on the single central vertical than on a dipole at about the same height. The horizontal wire invariably gives quieter reception in this noise plagued location. ●

Re-Vamping a VTVM

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A Japanese VTVM failed some years ago, and after several attempts at getting the open circuit meter repaired or replaced, it was finally concluded that the task was hopeless. Ten years later the need arose for a VTVM and another attempt, successful this time, was made to get the unit back into operation.

Further examination revealed that the small power transformer had developed short circuited turns, and the small semi-conductor rectifier which provided HT for the valves was open circuit.

A locally made transformer was installed This was a universal type which enabled a secondary voltage of 100V RMS to be obtained.

An EM401 diode was substituted for the defective diode.

A "University" movement was bought to replace the original one.

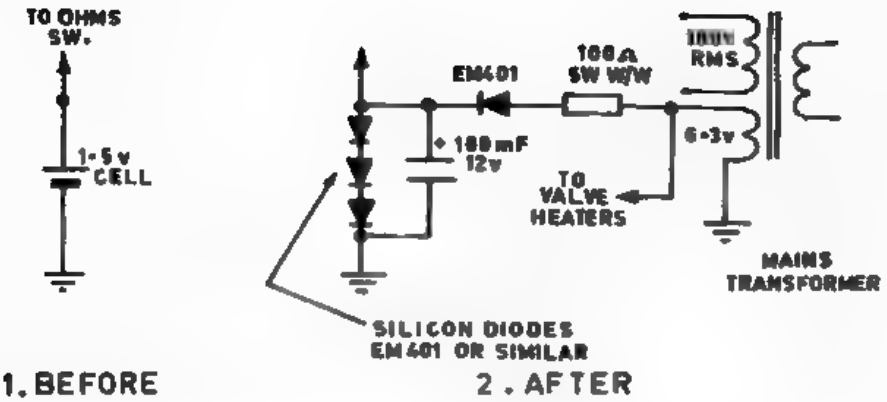
All components fitted into place with a little re-arrangement.

The VTVM then operated satisfactorily, but the need to replace the small dry cell used in resistance measurement seemed an obvious shortcoming in the design

After giving the matter some further thought the following circuit was installed

It can be seen that the three silicon diodes are used as voltage regulating devices. It was found that some diodes gave slightly different forward voltage drop figures, and eventually, three were located that produced 1.8V in series (see Fig 2)

This figure was slightly higher than the 1.65V which is found with a new cell, but it was found that the normal range of adjustment would accommodate the difference (2 diodes would not provide enough voltage to enable this to be done).



1. BEFORE 2. AFTER

The VTVM is now working beautifully and, given reasonable luck, it should not be necessary to open the unit up for a long time.

Since carrying out the repair, it was discovered that other people have had similar problems with small test equipment manufactured in Japan.

It is suspected that the transformers in these units are really designed for use at 60 hertz, and as a result they tend to over-heat when used on 50 hertz mains.

In some cases, devices of this nature have been observed which were rated at 220V.

A combination of over-voltage operation and insufficient core material would predestinate such equipment to a short life in this country.

Improvements to the Loudspeaker Filter

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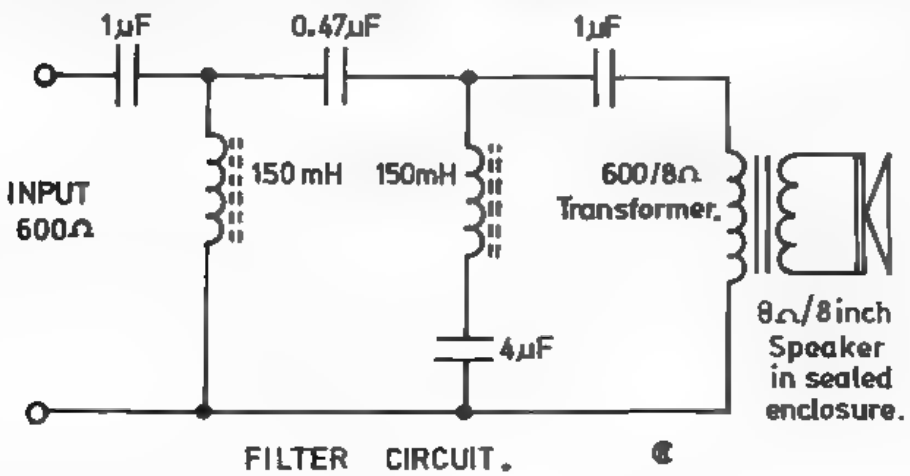
In September 1973 an article by VK3BM was published in AR entitled "Improved Loudspeaker Reproduction of SSB". It described the use of a sealed speaker enclosure and high-pass filter to improve intelligibility under noisy band conditions by attenuation of the lower audio frequencies. VK5NN suggested (in a letter to VK3BM) that the filter could be made much more effective by modifications which are the subject of this article.

The original filter was designed for use with an 8 ohm speaker. At such a low impedance level the capacitors are relatively large, electrolytics being unavoidable, and the inductors tend to have a low effective Q. Consequently the filter efficiency is low, and the attenuation increases only slowly as frequency drops below cut-off. If a higher impedance is used, requiring larger inductors and smaller capacitors, the filter efficiency can be improved. Also, with more practical sizes of components, it becomes simpler to add another stage to the filter and obtain a much sharper cut-off. Incidentally, there was an error in the original article in that the centre capacitor should have been only 30 microfarads rather than 60, but this does not produce any great change in the performance.

600 OHM IMPEDANCE

It is no coincidence that 600 ohms is the standard impedance used for most audio work involving filters, for example in the telephone system, as this provides a good practical compromise between the effects of series loss resistance and stray shunt leakage and capacitance, as well as permitting more practical values for filter components. Most audio equipment, including numerous models of amateur SSB transceivers, therefore include 600 ohm output terminals as well as lower impedances for direct speaker connection. Thus, by making use of this facility in conjunction with a separate 600 ohm to voice-coil transformer, the speaker filter may be designed for input and output impedances of 600 ohms. If the receiver or transceiver provides only voice-coil output (4, 8, or 15 ohms) then two transformers are necessary, but even then the benefit will be worth the slight additional cost.

The circuit of the improved filter is shown in Fig. 1. It has two sections, the first being of constant-k form, which gives steadily falling response below cut-off, but the attenuation becomes "infinite" only at zero-frequency. The second is known as m-derived, involving a series resonant shunt leg which gives a frequency of very high attenuation not far below cut-off. Its response at still lower frequencies then tends to rise, but this is offset by the still-falling response of the first section.



FILTER CIRCUIT.

FILTER PERFORMANCE

The filter characteristics were calculated (by the Technical Editor) using the component values specified in Fig. 1, and the standard filter design equations available in many handbooks. The impedance of both sections was found to be 550 ohms (near enough to the nominal 600). The cut-off frequency of the constant-k section is 290 Hz, and of the m-derived section 360 Hz. The frequency of high attenuation by the latter is 210 Hz. The combined effect of both sections should be to give negligible attenuation of frequencies above 360 Hz, but with rapidly increasing attenuation as the frequency drops towards 210 Hz. For all frequencies below about 220 Hz the attenuation will probably be more than 50 dB. This contrasts greatly with the behaviour of the constant-k section alone, which does not give 50 dB attenuation until the frequency has dropped to about 20 Hz.

As explained in the earlier article, most of the audio energy which makes 'static" and electrical interference so distracting is contained in the lower-frequency part of the spectrum. Conversely, most of the components of speech which are necessary for intelligibility fall in the range be-

tween about 1 and 3 kHz. Even with its relatively modest amount of low frequency attenuation, the earlier filter was capable of greatly improving intelligibility, so it may be expected that the improved filter will do even better, and reduce much more the hearing fatigue produced by almost continuous crashes of static.

COMPONENTS

It is suggested that the filter capacitors should be the polyester type of 100 or 160 volt rating. The 4 microfarad value may need to be made up of two 2.0 or 2.2 microfarad units in parallel, or perhaps an old-style block paper capacitor may be available from the junk-box. None of the values is especially critical. For the inductors the use of ferrite pot-cores is recommended (type FX2242 or similar). The manufacturer's data on such cores usually gives a figure for the number of turns to give 1 millihenry inductance. Since inductance is proportional to the square of the number of turns, about 12½ times the 1 mH turn figure will give the desired 150 mH. More information may be found if desired in the article "Building High-Q Inductors with Ferrites" by VK3ZRQ in the February 1973 issue of AR.

Finally, it is suggested that a switch be included to cut the filter in or out, or change to a normal speaker system to make possible a rapid comparison between the two. It is guaranteed that on a noisy band the result will be found most impressive, particularly if you are an older amateur and tend to have a restricted high-frequency hearing response. ●

To 1200 GMT Saturday, 14th March.
Mode CW only 3.5 to 28 MC.

Eligible entrants are radio amateurs licensed to operate in British Commonwealth call areas. VK1-8; Lord Howe VK2; Willis VK4; Christmas VK9; Cocos VK9; Norfolk VK9; Heard VK0; Macquarie VK0; and Australian Antarctica are all separate contest areas. P29 is now a single area.

Two Trophies have been presented for competition between VK stations — a silver medallion for the highest VK scorer in the official RSGB results, and a bronze medallion for a middle placed VK scorer based on total VK entries divided by two i.e. for 28 entries, to 13th placing; for 33 entries, to 17th placing. Overall winner in 1975 was VE3BMV and only 60 points separated the first four, VE, G, VE, G. VK3MR, placed 16th overall, and VK7RY, 81st, won the 1975 medallions.

Scoring: 5 points for contest exchange, plus 20 bonus points for 1st, 2nd and 3rd contact with each call area other than one's own (there are 111 in all, with G, GW, GC etc. counting as a single area) — exotic prefixes are the rule rather than the exception.

Logs: Separate logs are required for each band showing columns — 1. Date and time GMT; 2. Station worked; 3. Nr sent; 4. Nr received; 5. Band; 6. Leave blank; 7. Contact points claimed; 8. Bonus points.

Each band log should be separately totalled and should include at the end, a check list of all as worked on the band. Separate band totals should be added together and the total claimed score entered on a cover sheet giving particulars of station, QTH, equipment, power, and a declaration that the rules and spirit of the contest have been observed.

Entries may be single or multi-band. Single band entries should claim contacts on one band only, but submit details of contacts on other bands for checking purposes only. Entries should be addressed to — D. J. Andrews G3MXJ, 18 Downsview Crescent, Uckfield, Sussex, England. Closing date 17th May, 1976 (by airmail, please). ■

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers

The Editor,
Dear Sir,

QRP IS ALIVE AND WELL!

The purpose of this letter is to kindle some more interest in the low power field, as well as eliciting information from other QRP operators as to what they are up to and with what results.

Recent QRP/QRP QSO's from this QTH, include [illegible]rrie ZL2PV, Jim VK2BBO using a G5RV and [illegible]-7, Snow VK3MR with his 1 watt rig, Drew VK3XU winding down to 500 milliwatts, John VK2LM with his 15 watts and Vee, and Yoshi JH1RUF sporting 10 watts to a 2 element beam. These QSO's were from 40 and 20 metres and all CW.

The author has been experimenting with 40/20 metre directional aniennas in order to come up with an effective QRP station, and the list includes 4 element fixed beam, 40/20 X-beam, 40/20m quad and X-Q quad. The CQ WW DX CW contest was worked with the 3 watts into the 4 el beam, and resulted in 190 QSO's, 20 zones, 23 countries and a lot of fun, all on 20 and all CW.

Quickest QSLers as I see them are, W0IPU, VK5XD, VK5BS, KV4AA, VK4NL and VE3EWY.

Best 20m DX worked so far — A9XU, YV5AE and ZS6ME to complete the QRP WAC, and HZ1AB.

The old 5763 rig is due for mothballs shortly, as the belated Christmas present, an HW7, is due any day.

Hope to hear from other "Fleapower Men" either by Mail, QSO or on the CWN Sunday Mornings. Till then, best DX and vy 73s.

David S. Down VK5HP/QRP. ■

Dear Sir,

The article by Alan Shawsmith, "The Golden Years of AR in VK" (AR Dec., 1975) might have been interesting and more convincing had he taken the trouble to check his facts.

It was not to Charles Macfurcan A2CM, that the honour of making either the first VK-W or the first VK-Europe contact went. That honour belongs to Max Howden, then A3BQ, now VK3BQ and still active on the amateur bands. On Monday, 3rd November, 1924, just after 1900 EAST, Max worked U6AHP (not 5EKY) — see, for example, "Radio in Australia and New Zealand" Vol. 2, No. 45, 10th December, 1924 — and it was Max who wrote in this magazine, "I did my best to answer him, and he certainly managed to read me, although local 'hams' say they never heard such fearful sending. I admit my hand acquired a double phase vibration in place of the usual single, but it couldn't have been too bad". In the 26th November issue of the above magazine, Macfurcan wrote: "Congratulations to 3BQ for being the first Aussie to work U.S.A. 2CM had hopes, but it was not to be".

On Friday, 14th November, at 0500 EAST Max worked G2OD to obtain the double — first to America and first to Europe. The wavelength used for these contacts was about 85 metres.

Macfurcan, who certainly contributed greatly to amateur radio through the 20's was the first Australian to contact England on 20 metres. This was on Saturday, 2nd May, 1925, and G2OD was the other station (see, for example, Radio in Australia and New Zealand, Vol. 3, No. 59, 24th June, 1925).

What Shakespeare wrote was "All the world's a stage, and all the men and women merely players" (As You Like It, Act 2, Scene 7). Pedantic perhaps, but weren't we taught that if inverted commas are used, i.e. the writer is quoting, then the original words must be used and not a paraphrase of them. A careful reading of the story of Nebuchadnezzar as given in Kings, Chronicles, Daniel and Jeremiah fails to reveal anything about "scales". Was Alan thinking about that famous king's son, Belshazzar, at whose feast the mysterious hand wrote on the wall "Mene Mene Tekel Upharsin" (Numbered, numbered, weighted and divided) Tekel being interpreted in more detail as "thou art weighed in the balances and art found wanting". Let us hope that this will not be the fate of amateur radio!

By all means let us remember the past, and the exploits of the men who laid the foundations of amateur radio, but for goodness sake let us have the facts, which may be found in the documents of the time, and not woolly memories which only serve to create confusion.

Yours sincerely,
F. K. McTaggart VK3NW/2BNW ■

Dear Sir,

I am interested in using a Parametric Amplifier on 146 MHz and due to my difficulties experienced in obtaining the information required, I would be grateful if one of your readers could assist me.

Yours faithfully,
Gary Stern VK2ZBB,
C/o P.O. Box, 330,
Hurstville, N.S.W. 2226. ■

Trade Review

NEW TRANSFORMER

Ferguson Transformers P/L. have provided a sample of their new PL50/60VA transformer, a recent addition to their 'low profile' range. This small (10 cm x 6 cm x 5 cm) transformer, which looks somewhat like a 'fluro' ballast choke, has two windings of 25 volts, topped at 20 volts and rated at 1.2 amps each.

With the two windings in series the off-load voltage of 57V AC only fell to 53V AC at full load.

Connections are made via round 'quick connects' and six 30 cm coloured leads are provided with one end tinned and a connector on the other. A 10 cm lead is also provided with a connector on both ends for linking the windings.

On test the transformer was quiet and met the ratings given. It is claimed that this transformer meets AS C126. — VK3YFF.

IPSWICH RC 2M PREAMPLIFIER

"If I can get it going, anybody can". Well, I did, but reference to the relevant article in AR was a must. The instructions that came with the kit were poorly printed and vague, and the tinned copper wire provided to wind the coils was only enough for one coil.

Once mounted inside my deaf Pye 789, however, the story was quite different. Channel 40, dead a few moments before, was filled with stations and I found that my rig could now receive much better than it could transmit; reversal of the previous situation.

An A/B test on a recent trip to Ballarat showed that I could hear both 3RML and 3RWZ with the preamp, but not without.

A preamp will not necessarily improve a good rig, but if yours is a bit deaf, then I am sure that you would be pleased with the results of fitting one of these IRC units. — VK3YFF. ■

1976 SUBSCRIPTIONS REMINDER

No final notices will be sent out this year from the Executive Office.

All subscription notices already mailed carry the wording —

"FIRST AND FINAL NOTICE"

Please take note and arrange to pay your 1976 subscription at once if you have not already done so.

AR's will soon cease for unfinancials and missing copies cannot be supplied if your supply ceased because of being unfinancial.

PLEASE TAKE NOTICE.

The voltages quoted above are full load rms voltages. The no load output voltages could be up to 25 per cent higher, however the three samples tested exhibited better load-no load characteristics than his.

The DC resistance of the secondaries were found to be unbalanced by about 10 per cent in each of the samples. However, due to the high resistance of the primary (1.6 k ohms) and careful matching of turns ratios, there was negligible imbalance of secondary load currents in the parallel connection.

A pleasantly surprising feature of these transformers is the low temperature rise of the assembly. Even when seen on the bench at 20 per cent beyond maximum recommended load the transformers did not get very hot.

These transformers meet the requirements of ASC 126 for construction and insulation and the manufacturer claims they are the smallest locally manufactured stock type available.

The core size is approximately 4 x 3.2 x 1.4 mm. This trio of transformers deserves to be popular.

VK3AFW

PROJECT AUSTRALIS

OSCAR 6 ORBITS FOR FEBRUARY

The satellite is on Sunday morning, Monday night, Thursday night and Saturday night local times.

The time period is 114.99455 minutes. Longitude increment — 28.7487 degrees/orbit. Times are in GMT and longitudes are in degrees west of Greenwich.

		Orbit	Time Z	deg. Long W
Sat.	1.2.75	10496	0042.5	59.1
Sun.	2.2.75	10511	0137.4	72.6
Mon.	3.2.75	10523	0037.4	57.8
Thur.	6.2.75	10561	0127.2	70.2
Sat.	8.2.75	10586	0122.0	68.0
Sun.	9.2.75	10595	0021.9	53.9
Mon.	10.2.75	10611	0116.9	67.7
Thur.	13.2.75	10648	0011.7	51.4
Sat.	15.2.75	10673	0006.5	50.1
Sun.	16.2.75	10686	0057.9	59.1
Mon.	17.2.75	10699	0152.9	72.8
Thur.	20.2.75	10736	0047.69	58.5
Sat.	22.2.75	10761	42.56	58.2
Sun.	23.2.75	10774	0137.48	68.9
Mon.	24.2.75	10786	0037.41	53.9
Thur.	27.2.75	10824	0127.2	66.4

OSCAR 7 ORBITS FOR FEBRUARY

Time period is 114.945 minutes. Longitude increment is 28.736 degrees/orbit.

Orbit	Date	Time Z	Long W deg.	Mode
969	Feb. 1	0042.7	60.5	A
982	Feb. 2	0136.9	74.1	B
994	Feb. 3	0036.3	59.0	A
1007	Feb. 4	0130.6	72.6	B
1019	Feb. 5	0029.9	57.4	A
1032	Feb. 6	0124.2	71.0	B
1044	Feb. 7	0023.5	55.8	A
1057	Feb. 8	0117.8	69.4	B
1069	Feb. 9	0017.1	54.2	A
1082	Feb. 10	0111.4	67.8	B
1094	Feb. 11	0010.8	52.6	A
1107	Feb. 12	0105.0	66.2	B
1119	Feb. 13	0004.4	51.0	A
1132	Feb. 14	0058.7	64.6	B
1145	Feb. 15	0152.9	78.1	A
1157	Feb. 16	0052.3	63.0	B
1170	Feb. 17	0146.6	76.6	A
1182	Feb. 18	0045.9	61.4	B
1195	Feb. 19	0140.2	75.0	A
1207	Feb. 20	0039.5	59.8	B
1220	Feb. 21	0133.8	73.4	A
1232	Feb. 22	0033.1	58.2	B
1245	Feb. 23	0127.4	71.8	A
1257	Feb. 24	0026.8	56.8	B
1270	Feb. 25	0121.0	70.2	A
1282	Feb. 26	0020.4	55.0	B
1295	Feb. 27	0114.7	68.5	A
1307	Feb. 28	0014.0	53.4	B

Please note this new method of orbit prediction. The system has been changed to allow for more uniform coverage of both Oscar 6 and 7 and to conserve AR space. A few minutes work with a calculator and the standard orbits from the AR printout will provide azimuth and elevation for any particular QTH and orbit. Please also note that the modes of operation of Oscar 7 have been changed from those printed in December AR. ●

Hamads

FOR SALE

Yaesu FT2FB 2 Mx FM TXCR. 12 channel capability —Channels 40, 50, R1 and R4 (new) and 3 Japanese Simplex channels. Also Mobile Mount and Microphone, v.g. cond., 18 mths. old, $185.00 ONO. B. Bathols, VK3UV, 3 Connewarra Ave., Aspendale, 3195. Ph. (03) 90 6424 (evenings).

Geloso TX G4/228 P/SG 4/229, 1968 per SSB — CW — AM, beautiful condition, $350.00, mike and manual. E. Wookey, 156 Kilgour St., Geelong.

Laisyette HA-144 2 AM transceiver tunable Rx Tx xtal locked on 144.180, $100. FTV-650 6m transverter, wired for use with FT101, $100. Orion Stereo car cassette player less speakers but perfect condition, $55. VTVM, needs new meter, $10. VK3NM, QTHR. Ph. (03) 88 3710.

ZL Repeater crystals for Ken KP202, VK3BAX, QTHR. Ph. (052) 97401.

TCA1677 converted to 2m single channel. Very clean condition. Circuit and mobile mount. $80 ONO. VK3BAX. Ph. (052) 97401.

Collins 75S3 receiver, 32S3 xmitter, W/516FZ AC supply, 30L1 linear, all as brand new, huge saving, sell complete only. Ph. (03) 24 1231, AH (03) 20 6135. A. R. Roy, VK3ADR, 16 Kent Court, Toorak.

MTR13 converted, six channels, xtals for channels 8, 1, 4, $65.00. Ph. (03) 550 3521. Bill VK3SB.

One BSR Oscillator (audio), excell. order, $25.00. BC221 W/O P/SU with xtal, $20. One 3.5MHz — 7.5MHz tunable IF EA complete nearly, $30. Dusty Leopold, 9 Hyland Ave., Darlington, SA, 5047. Ph. (08) 296 4250 after 5 p.m. weekdays till 10 p.m.

FL-DX-2000 Linear Amplifier, $170.00 ONO, looks and goes as brand new. VK3TG, 2 Willow Court, Kyabram. Ph. (058) 52 1636.

SWR Power Meter, Asahi ME 2B, never used, $15.00. VK3TG, 2 Willow Court, Kyabram. Ph. (058) 52 1636.

MR6 FM mobile, good condition, unconverted, $35. Signal generator, advance 300kHz-60MHz, $20. Set of Eico 753 spares, $5. 100kHz vacuum crystal, $4. 1296MHz solid state converter, $15. Approx 70 Electronics Australia, $3 the lot. Bob Halligan, VK3AOT, QTHR. Ph. (03) 949 6612 Bus., (03) 277 8295 AH.

Heathkit HW22, SSB trans. mod. for 80-40-20, $60. SAE details, 100 logic ICs. $12. SAE details, vert. ant., as new, 4BTV and RM 80, 80-10, $45. VK3BBN, Main Rd., Harrietville, 3741.

FT-101, perfect condition, $450.00. "Ham-Cat" Hy Gain Mobile base mast and 80m, 40m and 20m coils, $65.00 Lot. All with manuals. VK3ASI, PO Box 907, Geelong, 3220. Ph. (052) 43-1283.

WANTED

R65/APN9 Schematic R391, R39Z, or 51J1, cond. secondary, spares, incomplete anything US armed forces technical manuals, also PRC74, 77, 25 or similar. Dusty Leopold, 9 Hyland Ave., Darlington, S.A., 5047. Ph. (08) 296 4250 (AH).

VHF or HF receiver, transmitter, transceiver, any band/mode, for new high school student ham. VK2YCR. Ph. (02) 982 3707. Tony Richardson, 15 Pertaka Pl., Cromer, 2099.

FT/FP200 transceiver, VK2QC, QTHR or Ph. (069) 62 3100.

Control Boxes and handbooks for R101/R101/ARN6/ ARN6 radio compass receivers. Lionel L. Sharp, VK4NS, QTHR.

Fax Freaks to make up bulk order to import Desk-fax Facsimile Transceivers 6" x 4" printout 300 lines per inch definition. Approx. $14.00 in Sydney. Details from VK2AKG via VK2BEE, QTHR.

FT101B or similar transceiver in good condition. Details and price to F. G. Storey, VK3ZNT, QTHR. Ph. (03) 277 3082.

Facsimile Machine, preferably direct copy type. Type, condition and price to VK5JE, QTHR. Ph. (08) 262 4622.

FT200 preferably with power supply. Ph. (03) 467 2131, business hours. ●

Silent Keys

Dr. R. W. ALLISON	**VK2AEA**
Mr. W. S. RINGROSE	**VK2BSR**
Mr. F. W. CHAPMAN	**VK4TH**
Mr. B. WHITMEE	**VK4ZW**
Mr. R. A. ISAAC	**VK4ZAI**
Mr. W. W. PARSONS	**VK5PS**
J. F. HURREN	**VK3JH**

JOHN WALKER VK2GA

It is with deep regret and sadness that I have to record the passing on 24.11.74 of John Walker, VK2GA. John was active on most bands since the war, he was an associate member of the I.R.E.E., a foundation member of the Woy Woy Rotary Club, a Past Master of Lodge Morning Star, and a life member of the Ettalong Memorial Club. Simply he was a wonderful community bloke, who responded to every demand on him and sought nothing in return.

His passing is a sad loss to the Central Coast and on behalf of all his amateur friends I extend to his wife Chris and family our deepest sympathy.

Major, VK2RU

J. C. (JOHN) WATSON VK6JW

It was with regret that we learned of the passing of John Watson VK6JW, on Saturday 26th October, 1974.

John first took out his licence in the Eastern States in 1947, shortly before coming to the west. He was a trained Pharmaceutical Chemist, and followed this profession for a number of years. In the early 1950s John was elected to the Council of the VK6 Division.

Amateur radio was not his sole interest however, as yachting played an important part in his spare time activities. He was at one period, Commodore of the Royal Freshwater Yacht Club. Naturally he was often heard operating maritime mobile from his vessel 'Silver Fin', under the callsign of VK6SF.

Prior to his passing, John had renewed his interest in the administrative side of the hobby and was once again elected to the Divisional Council. He was also keenly interested in the W.A. VHF Group and their project, the Communications Museum at Wireless Hill, where he was resident caretaker.

Both the Wireless Institute of Australia and the W.A. VHF Group, will miss John's enthusiasm and energy.

20 Years Ago

with Ron Fisher VK3OM

TWENTY YEARS AGO

January 1955

Amateur Call books were the in thing twenty years ago. The Editorial page of the January 1955 issue of Amateur Radio told of the arrival of the NZART Break-In Call Book. They have of course been producing this excellent reference ever since.

A technical article that was no doubt referred to many years after its publication was Command Conversions For Five Bands by Jim Herd VK3JK. Jim described how the various transmitter models could be converted for operation on the 80, 40, 20, 15 and 10 metre amateur bands, along with a suitable power supply, antenna coupler and multi band antenna.

A 'Simple S Meter'. Les Ellason VK3ALE described a simple bridge type meter circuit that could be applied to almost any receiver. Les used it with his BC348.

Expectations of six metre DX were high with the news that Macquarie Island was expected on the air in early January. A report just in from VR2CG tells of his reception of two VK6s on six.

Two comprehensive reports were published on the NSW Woy Woy Field Day and the Victorian Annual State Convention. ●

DIGITAL!

INTRODUCING ICOM'S NEW DIGITAL VFO

IC-21A - $298 **DV-21 - $298**

BOTH FOR $570 incl. tax

IC-21A FM 10W 146-148 MHz base station with variable power control adjustable deviation, 24 channels, built-in discriminator meter, S meter, SWR meter, PA protection, modular circuitry, runs from 13 V DC or 240 V AC. Complete with three channels. PRICE $298 incl. tax, extra crystals $7.80 pair.

OR WHAT ABOUT THE FAMOUS IC22?

IC-22 FM 10W 146-148 MHz mobile transceiver, featuring switchable power 1 or 10 watts, 22 channels, adjustable deviation, solid state T/R relay, built-in protection for PA, DC voltages filtered. Read Dec '74 "AR" for review. Complete with mounting brackets, microphone, cables, etc, three channels. PRICE $198 incl. tax, extra crystals $7.80 pair. Available ex-stock.

IC-3PA is a regulated power supply for all the Inoue mobile transceivers. It's completely regulated and gives you an indication of its operating condition: normal, excessive current, or if the protection circuit is working. There is also a built-in speaker in the cabinet. Price $78 incl. tax.

DV-21. The perfect companion for your IC-21A, the DV-21 is an all new unique digital VFO to complete your ICOM 2 meter station. The DV-21 will operate in 5 or 10 KHz steps over the entire 2 meter band. It can also scan either empty frequencies, or the frequencies being used, whichever you select. Complete, separate selection of the transmit and receive frequencies, is as simple as touching the keys. When you transmit, bright easy to read LEDs display your frequency. Release the mic switch, and the receive frequency is displayed. There are also two programable memories for your favorite frequencies. You won't believe the features and versatility of the DV-21 until you've tried it. It's new, and it's from ICOM. Price $298 incl. tax.

6M FM MOBILE TOO!

IC-60 6M FM 10W mobile transceiver featuring switchable power 1 or 10 watts. Complete with mounting brackets, microphone, cables, two channels. PRICE $234, incl. tax, extra crystals $7.80 pair.

90-DAY WARRANTY ON ALL PRODUCTS.

IC-30 70CM FM 10W mobile transceiver incl. 1 channel (435.00). Price $370 incl. tax.

IC-501 6M SSB transceiver, 10 watts pep with AM and CW facilities. Price $445 incl. tax.

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OUR POLICY: Persons not in possession of the appropriate certificate of proficiency will not be sold amateur equipment. This may have to be produced on request. Our terms of trading are strictly net cash, no COD, no credit other than Bankcard. All equipment sold carries the VICOM 90-day all-inclusive warranty. Add extra for freight or postage. Insurance cover 50c per $100. Prices subject to change without notice.

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